

February 1991

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The Magazine of the North American Data General Users Group



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# FOCUS

The Magazine of the North American Data General Users Group

## EDITOR'S NOTE

In the news

by Robin Perry

2

## LETTERS

Comments from our readers

3

## DG NEWS

Era ends as de Castro leaves DG

by Robin Perry

4

## ENHANCEMENTS

What's your problem?

At Data General's Research Triangle Park (RTP), committees do their best to handle requests for enhancement to products. Your requests will be filled more efficiently if you abide by the following

by Bill Cole

20

## MANAGEMENT

Managing for growth

When data processing is used effectively, everyone benefits. The key is to have your end-users and software writers support each other during the development process

by Steve Handlos and Liz Straus

22

## SOFTWARE LIBRARY

A complete listing of the NADGUG software library

24

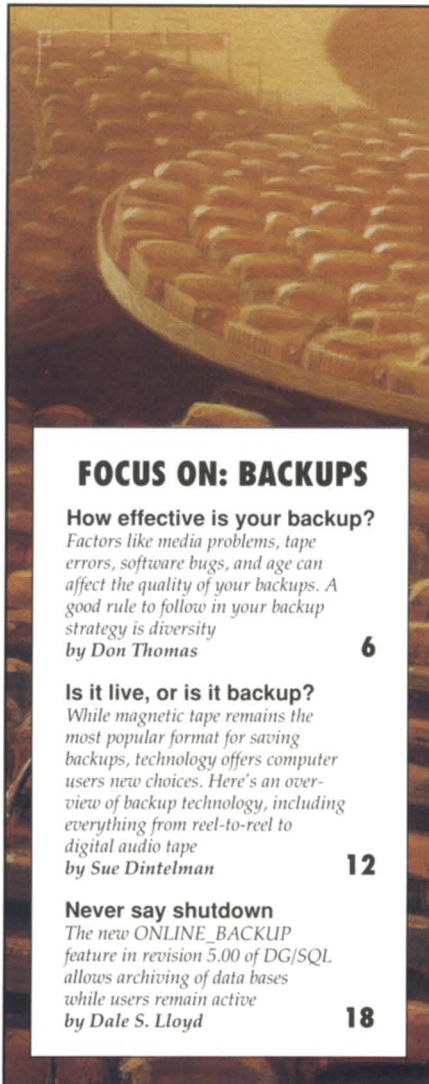
## ADAPTIVE TECHNOLOGY

Bridging gaps

With portability and special equipment, the computer industry leads the way in helping the motor-impaired find fulfilling employment. Part II in a two-part series

by Lori Rhea DiSorbo

26



## FOCUS ON: BACKUPS

How effective is your backup?

Factors like media problems, tape errors, software bugs, and age can affect the quality of your backups. A good rule to follow in your backup strategy is diversity

by Don Thomas

6

Is it live, or is it backup?

While magnetic tape remains the most popular format for saving backups, technology offers computer users new choices. Here's an overview of backup technology, including everything from reel-to-reel to digital audio tape

by Sue Dintelman

12

Never say shutdown

The new ONLINE\_BACKUP feature in revision 5.00 of DG/SQL allows archiving of data bases while users remain active

by Dale S. Lloyd

18

## SYSTEM MANAGER'S LOG

Make your Cobol move

There are quick and easy ways to bring your Cobol processing up to speed. Four revealing tests demonstrate which ones yield the greatest reduction in elapsed time and CPU time

by Brian Johnson

30

## BULLETIN BOARD

Bits and bytes from the bulletin board

35

## SCREEN TEST

Inside ICobol again

A revisit to ICobol reveals that a lot is happening. New products include C-Thru from Threshold and MV Windows from Digital Dynamics. Version 1.60 is in Beta testing. Version 1.70 will bring many language enhancements and the long-awaited STRING and UNSTRING verbs

by Tim Boyer

37

## PRODUCTS AND SERVICES

The latest products for DG systems

40

## ON-LINE HELP

Who to call for information about NADGUG and Focus

42

## FISCAL NEWS

DG's annual report reveals 1990 was a bumpy year

45

## IN GENERAL

News and notes from the DG community

48

## RIG/SIG GIGS

Interest group and NADGUG events

48

Cover illustration by Barry E. Jackson

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## In the news

Data General, that great little computer company that no one's ever heard of, has been in the newspapers lately.

Following several months of silence from its advertising department, Data General reappeared with a so-called "green" ad in the *Wall Street Journal*. This latest trend in advertising is supposed to make you want to buy a company's products because of the good things the company does for the environment. The example that comes to my mind is a slick series by Chevron that shows an eagle safely landing on a utility pole in what appears to be a wilderness area. The commercial leads you to believe that if it weren't for Chevron placing a wooden beam on top of the utility pole, the eagle would end up like its Kentucky fried cousins.

Critics say this type of advertising doesn't always work. Consumers may think they are being misled. They'd rather have corporations clean up their act environmentally, than make a token gesture toward conservationists. The Chevron commercial, for instance, doesn't tell you what the utility pole is doing in eagle territory in the first place.

Data General's green advertisement took the form of a half-page horizontal spread in the *Wall Street Journal* (price of \$99,385 for one-time publication). The ad declared "Good News For Planet Earth" and had a brief paragraph saying that Data General will be installing a sophisticated new computer network of Aviion Unix servers and workstations for the U.S. Geological Survey. This is old news, of course. Data General won the contract in December of 1989. Due to protests by the losing bidders, it was not able to ship computers until a year later. In October, the U.S. Court of Appeals for the Federal

Circuit Court in Washington, D.C. upheld the awarding of the contract to Data General.

The USGS contract made news again when a congressional subcommittee of the U.S. House of Representatives announced that it is investigating the contract award. However, based on the judicial investigation and ruling in its favor, Data General is shipping the systems.

Data General needed something big to make the statement that, come hell or high water, it will install the Aviion system in the USGS. While I think the verbiage "the struggle to preserve wetlands and protect the environment has a powerful new weapon" was overstated, I think the ad gets Data General's message across in a powerful way. Since the contract is valued at \$127 million, a more appropriate title would have been "Good News for Data General."

Data General was in the news again in December when founder Edson D. de Castro was ousted by his own board of directors (see story page 4). Many articles lauded de Castro as a visionary and computer industry legend. Now that de Castro is gone, the fate of Data General rests in the hands of Ron Skates, former de Castro advisor, and now president of Data General. Skates acknowledges that he is not a visionary like de Castro, but that he knows how to make good business decisions. He's had the difficult task of leading DG through its restructuring and layoffs. While this does not make fans among longtime and former DG employees, Skates is perceived as competent and efficient among the user community.

Yes, Data General has been in the news a lot lately. But the best news of all would be of the green variety. The color of money, I mean, as in a profitable first quarter in 1991. △

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## Reviewer garners gripes

While initially pleased that your publication chose to print a review in your December issue of our report writer, Intelligent Query (IQ), I was dismayed to find the article conclude with what were described as "not a lot of gripes"—several of which were totally inaccurate. The article's author, Tim Boyer, evaluated a beta version of IQ for AOS/VS in May and June of this year [1990] that admittedly—as beta versions do—had some bugs. Mr. Boyer made criticisms of IQ based on that early beta test version, without checking to see if those problems had been corrected or identifying the version he tested as a beta version.

In order to set the record straight, I'd like to specifically address each of the five "gripes". First, the bug in the "transfer to Lotus" option was corrected months ago. At the same time, the limitations on IQ's file renaming routine have been removed. This means the perceived ACL problems in SETUPIQ no longer exist.

Mr. Boyer expressed frustration at IQ's method of data name selection. He suggested a capability similar to Lotus 1-2-3's control-arrow key combinations to move through field names a page at a time. IQ supports the "page up" and "page down" keys to intuitively accomplish exactly what Mr. Boyer requested.

As to the fatal error problem, it should be noted that was with the SETUPIQ utility and not with IQ. Since the end user never sees the utility and Mr. Boyer never had any trouble running IQ itself, I think the problem was overstated. Another end user item to consider: the comments in DEFACL release notes are there for those with less expertise than Mr. Boyer in the installations of new software.

In regard to overall performance, Mr. Boyer's criticism seems unfair. First, IQ is a generalized and full-featured report writer and query manager. Anyone can write a program in a third generation language like Cobol that can outperform IQ in a specific task. The point of IQ is that users can specify, design, and generate reports with IQ in just a fraction of the time it took Mr. Boyer to write, compile, debug, and run the "simple" Cobol pro-

gram mentioned in his text. Second, IQ's speed has been improved since Mr. Boyer's beta version test and our current AOS/VS users have not found performance to be a problem.

We have enhanced IQ by reducing the number of screen I/O's performed during lengthy operations and by allowing users to specify AOS/VS SORT/MERGE in place of IQ's internal sort—and we will continue to improve its performance.

IQ is the number one report writer in the Unix, VAX VMS, and PC DOS environments. At a time when most other major software vendors are abandoning AOS/VS, we are continuing extensive and aggressive development and business efforts.

In conclusion, we feel that your readers would have been better served if Mr. Boyer or the *Focus* magazine staff had verified the information and product status before publishing an article with factual inaccuracies that criticized a product.

Charles R. Chitty  
President and CEO  
Programmed Intelligence Corporation



*First, I had no idea that the software provided by Programmed Intelligence was a beta test. Neither the manual nor the tape say so. I work with beta software often, and always have to sign a non-disclosure agreement. I would not knowingly review a beta test.*

*Second, Mr. Chitty states that "several of [my gripes] were totally inaccurate." He then acknowledges that the gripes were accurate, but pleads extenuating circumstances. The Lotus bug was fixed. The name selection may have worked in the beta version, but as far as I can tell wasn't documented. The fatal error existed, and was a concern to me not because of where it existed, but because of its lack of a coherent error message.*

*I commend Programmed Intelligence for staying with AOS/VS. As I said in the article, the package was very close to being a great report writer. Maybe, by now, it is.*

Tim Boyer

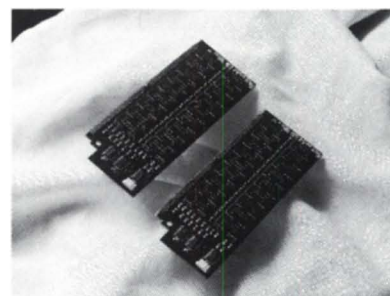
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# Era ends as de Castro leaves DG

by Robin Perry  
Focus staff

When the announcement finally came that Data General co-founders Edson D. de Castro and Herb Richman would leave the company that they helped found 22 years ago, it was no surprise.

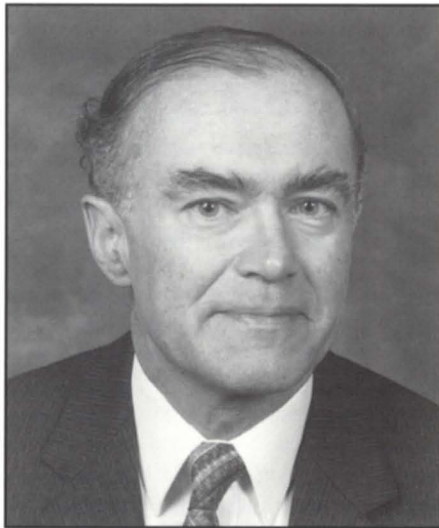
De Castro, 52, was given a not-so-gentle nudge toward early retirement in November 1989, when his Chief Operating Officer Ron Skates was named president of Data General. At the same time, de Castro was given the ambiguous title of chief scientist and named chairman of the board of directors. However, de Castro did not leave voluntarily; in December he was asked to step down by his own board of directors.

Outside of Westboro, the DG user community seemed to take the news philosophically, and, in fact, DG's stock rose a quarter of a point the day of the announcement.

"I feel that DG is going to go on well with Ron Skates at the helm," said C.A. Miller, vice president of information at Southern States Cooperative. De Castro hired Skates in 1986 as senior vice president of finance and administration. Skates gradually took over more of the day-to-day operations of the company, until 1989, when he replaced de Castro as president, becoming only the second person in DG's history to hold the position.

Miller added that "I've always had a great deal of respect for Ed. Not many guys can start a company in their garage and turn it into a billion dollar business."

De Castro has been called a "legendary entrepreneur of the computer industry." He was instrumental in designing Digital



Edson D. de Castro

Equipment Company's first successful minicomputers, the PDP-5 and PDP-8. In 1968, de Castro left Digital and along with Richman, a sales manager from Fairchild Camera and Instrument Corporation's Semiconductor Division, attorney Fred Adler, and two others, founded Data General. Adler remains on DG's board of directors and chairs its executive committee.

Richman said he will stay on with DG until the end of the current fiscal year, September 1991. He will not stand for reelection to the board, but will continue to serve as executive vice president for the Asia/Pacific region.

Under de Castro's reign, DG was known for producing "hot boxes." The company grew rapidly in the 1970s, producing successive generations of 16-bit Nova and Eclipse computer systems. It reached the Fortune 500 list in 1979. Its heyday occurred in the mid-eighties with the employment of 17,000 people worldwide. But as minicomputer sales slumped and the desktop PC and workstation revolution caught on, DG fell behind its competitors and has been struggling to keep above water ever since. It has been five years

since the company was profitable. De Castro says his biggest mistake was not foreseeing the PC boom.

But some complained that DG's troubles came from within. In addition to a reputation for building hot boxes, the company had an image problem. Lack of an image, that is, DG engineers and programmers seemed more interested in building products than selling them. "That wasn't in their mentality. That was other peoples' problem," said Frank Perry, NADGUG president. "Now those other people are running the company."

Three years ago, de Castro led DG into the open systems market with the development of the Aviion line of Unix workstations and servers based on Motorola's RISC chip. Open systems business has not cured DG's ailments. Although Aviion had first-year sales of over \$100 million, the company has yet to regain profitability. Minicomputer manufacturers trying to break into the open systems market have found it difficult to make money due to tight competition from younger, leaner companies.

De Castro told the *Boston Globe* that although he did not wish to resign, he feels no bitterness, and he hinted that he may return to the computer industry.

At DG headquarters in Westboro, long-time employees voiced regret for de Castro's departure, and the way he was forced to leave the company he helped found. "Even though we were expecting it, that doesn't make it easier or acceptable," said one employee. "A lot of people are anxious to express their support for Edson. It's just not true that you can blame him personally for the downturn of the company." Δ



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# How effective is your backup?



## **SYNOPSIS**

*Factors like media problems, tape errors, software bugs, and age can affect the quality of your backups. A good rule to follow in your backup strategy is diversity.*

by Don Thomas  
Special to Focus



Everyone would agree that an effective backup is a requirement in a well run computer operation. However, few would agree on what constitutes an effective backup. Read on and see if your backup procedures are as sound as you imagine them to be.

If you have to use your backup, are you 100 percent satisfied it will do what you expect? Are there possible media problems that would leave you dead in the water? Magnetic tape has a retention life of about five years. Most backups are refreshed much more frequently than five years, so that presents few problems. You might start to worry about your company archive that's been in storage since 1987. The tapes can be duplicated periodically to eliminate the shelf life problem.

### **Betting the farm**

Media problems are the most common causes of bad backups. They are the easiest to prevent. Keep a close watch on tape

usage. Tapes should be cleaned after 10 uses and recertified after 50 uses. Do this only if you are serious about the quality of data you retrieve from your mag tapes.

Soft tape errors are potential problems. These errors are logged in :ERROR\_LOG and list tape errors that occurred while your system was being backed up. Most sites suppress the reporting of soft tape errors to the master console and the only way you can become aware of soft tape errors is through the ERROR\_LOG entries. Soft tape errors are not the problem. They are only potential problems. An excessive number of soft tape errors means your tape is a candidate for cleaning or recertification.

Don't bet the farm on one backup. You should have at least two sets of media. Use one this time, the other set for the next backup. Three or four sets is preferable. Is this overkill? No. With one set of backup media you are destroying your backup while creating a new one. If you have a problem during this process, you will find you have no backup. Two sets prevent this situation. Three or four sets allow you to rotate one set off site.



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Use different tools to increase the effectiveness of your backups. PCOPY is fast but it doesn't allow the flexibility to restore to a different configuration. DUMP /LOAD format is very portable but be aware of backing up data bases that are in use. DUMP\_II/LOAD\_II and DUMP\_3 /LOAD\_3 increase the speed of backing up to near PCOPY levels. They also eliminate the need for labeled tape. This

means that each of your tapes is a standalone unit. Files may be retrieved from any one tape or from several tapes. Conventional labeled tape sets are considered one tape. If there is a bad spot on one physical tape, the entire set is bad, though all may not be lost if you have DUMP\_3.

LOAD\_3 has two switches that can turn the labeled tape set with the bad spot from garbage to gold. /ILABEL tells LOAD\_3

to skip the label that is file 0 on each tape of the set. /SPECIFIC tells LOAD\_3 to start with the first consistent file on the volume. You will lose something due to the bad spot on the tape but, with luck, it will only be a minor file that is easily replaced.

You will surely be burned if you place all your backup eggs in one basket. PCOPY had an obscure bug that prevented it from backing up the first 4096 sectors of a disk. A customer had given a disk up for a diagnostic run with the confidence of a secure backup. When the backup was restored, there was a chunk of data missing that rendered the remaining information on that disk useless. The problem with PCOPY was easy to fix. The retrieval of

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**F**ire drills are a reasonable way to confirm that your backups provide the protection you expect

the lost data was difficult, and required a great deal of effort on the part of everyone involved with the problem. A DUMP /LOAD backup would have eliminated the crisis.

Substitute a hardware problem for the software problem in the previous story and you have a case for backups to different media.

Consider this next example. The system is an MV/40000 HA. The operation does not allow the system to be down for more than a few minutes. Backup seems impossible due to the excessive time required to accomplish the task. One solution involves the MIRRORING and DUAL PORTING options of AOS/VIS to backup disks off line. The data base disks are dual ported between the primary and secondary con-



trollers in the MV/40. The disks are mirrored. Once the disks are in sync, the data base application is brought down and the mirror broken. The application is then brought back up. The disk is initialized into the file system using the secondary controller—this prevents unwanted competition on the primary controller—and the data base is available for backup via a variety of tools. The copy left on the disk is itself a backup copy. The total application downtime is only a few minutes and there is a small performance hit while the disks sync.

There is another site that does backups morning, noon, and night to a Megatape unit. When problems occur that require FIXUP and/or IVERIFY, they restore from the previous backup. It takes about the same time to restore as to run FIXUP on their five disks. They have eliminated the seven-hour IVERIFY in favor of restoring from a transaction log or re-keying the transactions. Since they never lose more than four hours of transactions, they save at least three hours with this procedure.

**How big is your basket?**

Now think big. Really big. What are you going to do if your site is destroyed? The basket is bigger. Are all your eggs in this one too? Flood, fire, earthquake, tornado, or hurricane all can put you out of business permanently if you don't have a plan. Disaster recovery specialists offer you an alternative site to carry on with your data processing needs. They will work with you to ensure you have the required resources available should the need arise. There are too many options available to mention at this point. Ask yourself, "What happens if the computer room goes up in smoke?" Where do you turn if your building is inaccessible? If you can kick the computer's plug out of the wall and continue to do business, you probably don't need the services of a disaster recovery specialist. If your hands start sweating and you get a sick feeling in the pit of your stomach, you need to contact one of these specialists immediately.

The value of your data should determine the procedures you follow to back up. The rate your data changes determines the frequency of your backup. If you have a read only data base that is worth \$1 million and is updated monthly, then your backup strategy would differ considerably from that of an order entry sys-

tem that logs several thousand order transactions per day.

Establish a backup regime and stick with it. Don't wait for a disaster to find that your daily backup is three weeks old. You are buying insurance with the time you allocate to backups. That insurance policy is only as good as the most current payment you've made.

Fire drills are a reasonable way to con-

firm that your backups provide the protection you expect. Simulate an emergency and then go through your procedure to recover. A good time to implement at least a partial fire drill is when you have to give up a disk for maintenance. Ensure that you have taken precautions to adequately save the data on the disk. (Do this in addition to your normal backup.) When the disk is returned after maintenance is

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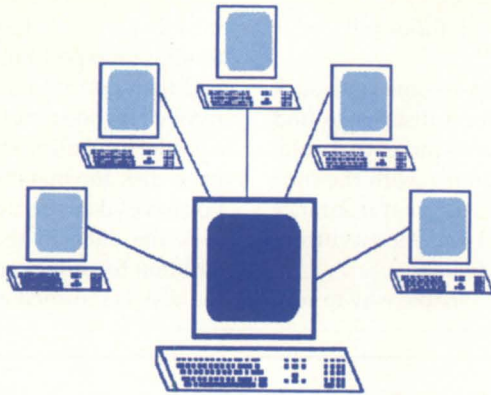
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completed, treat it as a real life disaster and apply your normal backups to the situation. Evaluate the results very carefully. Remember, this is a test of the normal backup system. You still have the extra backups you made prior to turning the disk over to the maintenance group. You will become more confident that you can deal with a real disaster situation once you see your backup system put to the test.

### Don't forget to look back

Read your backup tapes periodically. (This includes all media for that matter.) The /N switch (DUMP/LOAD format only) will read through the tape set and display the filenames it finds on the tapes. This allows you to scan the list of files to ensure it is complete and it gives a reasonable indication the tapes are in good condition. Short of loading the files and using FILCOM, there is no way to verify the actual data contained in the files on tape.

COPY/IMTR={tape buffer size} @NULL @MTD0:x will read every tape record in file x on the tape. If this command completes without error, then you have done just about everything to ensure your DUMP/LOAD backup tape is good. X DISPLAY/NO\_LIST @MTD0:x @NULL accomplishes the same task but faster. DISPLAY figures out the buffer size for you and it is multitasking. Both of these features will save you a few minutes over COPY. You should use one of these commands to verify every file on the tape.

PCOPY offers a verify process upon completion of the backup process. This option doubles the backup time but gives a greater degree of confidence in the integrity of the backup on tape.

The bottom line is "You are not as secure as you think you are."

There may be more problems than you can deal with. I don't think you could cover every eventuality. You would remove the spice from life if you had *everything* covered. Think about your operation. Eliminate the fluff. What absolutely, positively, and without a doubt must be on-line to make your business go? That's where you start. Δ

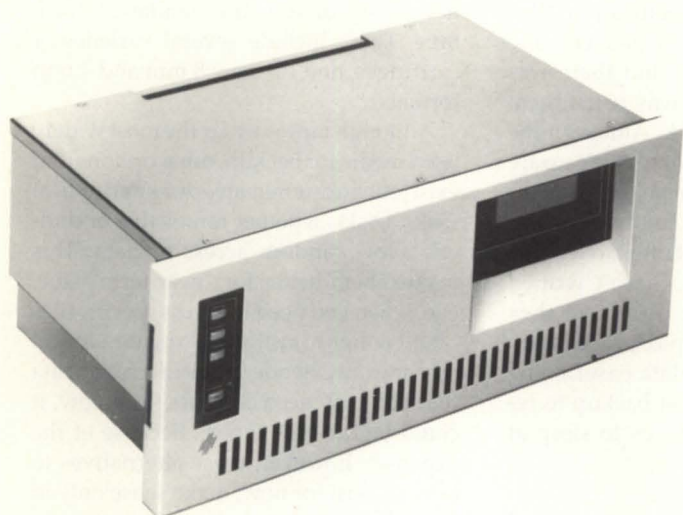
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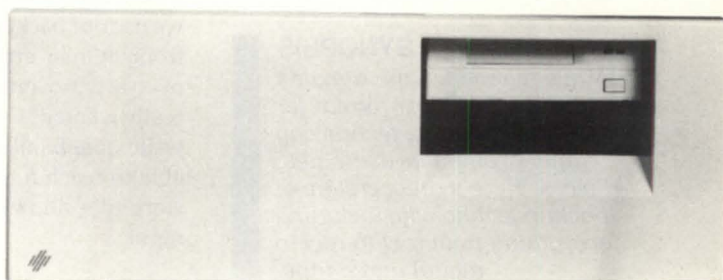
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# Is it live, or is it backup?



by Sue Dintelman  
Special to Focus

**B**

acking up is a way of life for system managers—at least it should be! Try to imagine what your company would do if your data files disappeared one day and there was no way to get them back. Although the

first reasons we think of for backing up are protection from machine failure or other assorted disasters (floods, fire, burst pipes), we use our backups most often to recover from human error. Who hasn't written over a word processing document they really wanted? Or had a piece of software write quietly all over a data base? Being able to reach for the latest backup to restore files allows most of us to sleep at night.

### Changing technology

Backup technology has evolved dramatically over the last several years, like

most other aspects of the computer business. Before Megatape introduced the MT 500 cartridge drive in 1984, the only format available for Data General machines was 9-track reel-to-reel. Today, there are a variety of options for backing up magnetic disks besides the standard 9-track tape. These include several varieties of cartridges, and the new 8 mm and 4 mm formats.

Although tape is by far the most widely used media for backup, other options that exist today are removable disks and optical disks. Disks, whether removable or optical, allow random access to data. This makes them better for "near term" storage, when you need to access specific files often enough to justify the expense. Optical provides an extended shelf life, so for data that you may need 30 years from now, it could be the best choice. Because of the expense, however, these alternatives to tape, at least for now, make sense only in special applications.

So, backup for the present means tape backup. Before exploring in detail the

**SYNOPSIS**  
*While magnetic tape remains the most popular format for saving backups, technology offers computer users new choices. Here's an overview of backup technology, including everything from reel-to-reel to digital audio tape.*

**Figure 1: Backup technology options**

	Reel-to-reel	QIC	8 mm	4mm
Drive price	\$6,800—\$55,000	\$1,500	\$9,000- \$14,000	\$7,600
Media price	\$15	\$25	\$10	\$16
Capacity (maximum)	145 MB	150 MB	2.3 GB	1.3 GB
Data transfer rate	48 KB/sec— 700 KB/sec	100 KB/sec	246 KB/sec	183 KB/sec



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variables to consider when choosing a tape backup technology, a brief overview of the different options available is probably in order. Figure 1 (page 12) summarizes the main features of each option.

## 9-track reel-to-reel

Most half-inch reel technology today is 9-track, which means that data is laid down on the tape in nine parallel tracks at 800,

1600, or 6250 bits per inch (bpi). This technology is the oldest magnetic tape technology, and is almost 100 percent interchangeable between all the drives that handle it. The ability to interchange data is probably the greatest advantage of reel-to-reel. You really can make a tape on your DG machine, and load it on an IBM mainframe or a DEC machine.

Tape lengths vary from special order

small sizes for software distribution, to 2,400 foot reels that can hold a maximum of 145 MB at 6250 bpi. Drives vary in price from \$6,800 to \$55,000, depending on speed and density options, so there is something for everyone. Data transfer rates for 9-track tapes range from 48 KB/sec up to 700 KB/sec. The 2,400 foot reels of tape run about \$11 each.

## Cartridges

All other tape technologies use some type of cartridge or cassette. Over the last few years, a series of cartridge devices has been available for DG machines—the 12.5 cartridge drive (the “toaster drive”), the initially problematic 21 MB cartridge drive, and most recently, the 130 MB cartridge drive. Each drive is an attempt at a reliable, low cost device to replace the more expensive 9-track format. None of these drives are now sold with new systems, but of course, remain used by the installed base.

Note: if you missed the initial introduction of the 21 MB tape drive, you were lucky! The “cheap” tape (so called because the tapes were not!) device had a few reliability problems. Normally, reliability is not a serious consideration when choosing a backup device, because it should go without saying that a backup device is reliable!

The reliability problems were eventually resolved, and when DG released the tape formatter, it was possible to purchase the media at a greatly reduced rate (\$16 vs. \$50). This tape drive is not currently recommended as a primary backup device (although it was the only option on the first MV/2000s) because the drive does not have a read after write head to check for errors. If you still use the 21 MB tape drive as your main backup device, always check your tapes by trying to read them after they have been written to compensate for this lack.

## QIC tapes

The cartridge technology of choice today is the quarter-inch cartridge (QIC). The acronym QIC stands for the drives and the cartridges, and is also shorthand for the standards setting organization Quarter Inch Cartridge Drive Standards Inc. The QIC 150 standard is a popular backup choice, not only for Data General machines, but also for the PC, network, and minicomputer markets in general.

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6299 6250 BPI Tape ...	\$9,500
6125 Tape S/S .....	\$795
6026 Tape S/S .....	\$1,750

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UDA50-A .....	\$450
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KDB50-A .....	\$5,500
Fujitsu 2351A .....	\$2,000
Emulex SC03/BX .....	\$295
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DELUA-M .....	\$3,800
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DZQII-M .....	\$350
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Even though the transfer rates are slow, QIC drives have large capacity combined with a relatively low price.

But don't be misled into thinking that you can easily interchange data using QIC tapes! There are more than 30 QIC standards for everything from the interface, to the tape format, to data compression. A drive that uses a QIC cartridge isn't necessarily a QIC drive, and even if it is, it may use a different QIC format than another QIC drive. Recently we helped someone with an extensive Unix network (including half a dozen different hardware platforms) transfer some data from a 9-track tape to a QIC cartridge. Only one of their six tape drives could read the 150 MB tape made on our Aviiion.

However, the standards have helped a number of manufacturers enter the marketplace, and have probably helped keep the prices down. Although the drives are relatively inexpensive, you need to consider media charges for cartridges. The price (about \$24 from our supplier) is higher than other types of tapes because the housing contains not only the tape, but also hardware to make the tape move. A cartridge with this hardware requires simpler, less expensive drives.

**8 mm helical scan**

Helical scan technology increases the capacity of a single cartridge. Available on MV machines since 1988, a single 8 mm cartridge can hold up to 2.3 GB of data, and capacities of 5 GB are planned. I find this option incredible. Assuming that you have been backing up your system using 2400 foot tapes at 1600 bpi, you can put as many as 55 tapes worth of information on *one* cartridge. For many systems, this means that you can have unattended backup. Pop a cartridge in the drive, start the backup, and go home! No more staying for hours switching tapes.

The 8 mm drives have captured the fancy of the computer industry, and are available from Data General and several third party vendors. All the drives are built by Exabyte, a Colorado company using an 8 mm analog VCR mechanism supplied by Sony. The helical scan technology is the same as that used in VCRs, and the tapes used are the same 8 mm video tapes you can buy almost anywhere for \$10. Data is recorded on the tape in long, diagonal stripes (actually, sections of a helix).

One of the problems with the 8 mm format is that you have all your eggs in one basket, a small one at that. For some sites, this presents a security problem that didn't exist when data was recorded on many 12 inch reels of tape. It was hard to sneak out with a multi volume backup. That same information now fits in a shirt pocket size package. One response to this threat is data encryption systems that en-

crypt data as it is written to tape.

Another drawback to the 8 mm technology is that loading specific files can be very slow due to the lack of a fast file positioning mechanism. To find a specific file on a tape, each block is read as if it were going to be loaded. If you need to recover a file from an 8 mm tape, it can take over three hours to position to a file at the end of the tape.

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There is a positioning mechanism that searches for tape file marks (which are marks that separate sets of files written with one dump command) at a speed that is 10 times faster than the normal read times. To use this mechanism, system managers must either use special software, or take the time to divide their normal incremental and full dumps into several smaller dumps. Then, if a file needs to be recovered, the tape can be positioned fairly quickly to the correct dump file, and then positioned more slowly to the specific data file.

One last drawback to the 8 mm format is the inability to read past the logical end of tape. This means that the unlucky person who accidentally writes over the front of a good tape is out of luck. All 2.3 GB are now lost. With 9-track tapes, this is not the case; the drives will position after a logical end of tape allowing data to be recovered from a tape that has inadvertently been written over. However, despite this list of drawbacks, the 8 mm format offers fast, large capacity backups with low cost media—a fantastic choice for many installations.

## 4 mm DAT

The 4 mm DAT is the newest backup choice and still in the proving stages. Some industry experts believe it will push 8 mm aside, but others see it as just another alternative. The 4 mm DAT is based on consumer digital audio tape (DAT) technology. A single 4 mm tape can hold up to 1.3 GB, with larger sizes planned. Like the 8 mm technology, it also uses a helical scan recording mechanism. But a variation allows for less contact between the tape and the heads, and lower tape tension, causing less wear on the tapes.

The data transfer rate of the 4 mm device is 183 KB/sec vs. 246 KB/sec for the 8 mm—25 percent slower than 8 mm for dumping and restoring a full backup. However, the biggest difference between 4 mm and 8 mm formats is the positioning for loading. It is possible to position to a file mark on a 4 mm cartridge at a speed 200 times faster than the normal read speed, compared with 10 times the read speed on an 8 mm drive. For some installations, the smaller capacity and slower data transfer rates of 4 mm is offset by the ability to access specific files quickly.

You can buy 4 mm drives for DG machines from most of the third parties listed

**Figure 2: Third parties with DG backup solutions**

Contemporary Cybernetics	804/873-0900
Dataplus	213/618-2090
Delphi Data	619/275-2892
Interscience	617/270-6630
Megatape	818/357-9921
Signal Computer Products	508/263-6125
Spectra Logic	303/449-6400
Zetaco	612/941-9480

in Figure 2, and these drives should be available from Data General soon.

## Choosing backup technology

When configuring a small machine, there may not be any real choice about a backup device. If you are only going to get one drive, then it will probably have to be

## 24 Hour Operation

by Sue Dintelman  
Special to Focus

When an application must run 24 hours a day, protection from disk failure is usually accomplished with redundant disks. But how do you get the backups needed for protection from human error and other disasters? The solution for Erlanger Medical Center in Chattanooga, Tennessee was the Concurrent Backup System from Delphi Data.

According to John Haltom, technical services manager, Erlanger was being squeezed by an increasing need for more disk space, but only a two hour window to shut down and do the backup. As the backup time increased to three hours and was still growing, a different solution had to be found.

The Concurrent Backup System consists of a cache box, two disk drives, and a tape unit. The disks are mirrored during normal operation. When the operator wants to back up, one of the drives is frozen (no writes are made to it), and the contents of that drive are copied to tape. Once the backup is complete, the disks are resynchronized. Haltom is enthusiastic about the Delphi solution. "The Delphi product has solved our problem. We get the backups we need with no down time, and in addition to the transparent backup, we also saw a performance improvement due to the Cachebox." Δ

the type that reads your software distribution tapes. But if you have options, there are several variables to consider.

1. *Usage.* Is the device going to be used for normal protective backups? On-line data base logging? Creating/accessing archival data? Interchanging data/software with another machine? One or more of the above?

2. *Suitability.* When purchasing a tape drive, naturally be certain that it can run on your machine. Consider slot and controller requirements for a new device. Any vendor will help you determine your options.

3. *Price.* In addition to the initial hardware purchase price, it is important to remember the ongoing price for media and staff. It may pay to purchase a more expensive drive, if you can do unattended backups that use inexpensive media.

4. *Speed.* The speed of the backup is more and more a consideration. It used to be that most shops shut down for a while each night to do a backup. As systems have grown and uptime has increased, the time available to do a backup has gone down while the amount of information to backup has increased. This pinch forces some sites to focus on speed of the backup as their most important consideration. Other system managers not so pinched feel that their backup is done unattended after hours, so who cares how fast it is!

If the backup is used frequently to restore individual files, then the speed of restoring specific files may have to be a more important consideration.

5. *Compatibility.* If you are replacing old technology with new, what will happen to all the archive tapes in the back room? Will you have a way to reload them if you need them? Getting a system with an 8 mm drive may sound like a good idea, but if it is your only tape drive, how will you get software updates? Do you need to send tapes to the mainframe at corporate headquarters? This will probably require 9-track.

6. *Support.* Because of the critical nature of tape backup, you want to look very carefully at the support from vendors you purchase the equipment from. With



today's tape drives, it is probably not the hardware that will cause you problems. Most of the hardware repairs are accomplished by swapping out the entire unit anyway. What can create problems is how the device works in your specific application, and that type of problem requires some level of DG knowledge. You don't want to discover that you have a support problem when you need to reload a tape.

are done—a view of the future shared by many experts including John Hartjen, product manager for purchased peripherals at DG. Systems will not be able to shut down to backup entire disk or disk systems, so backups will need to run in the background. Which files should be backed up will depend on access time and other variables. These systems will need to manage a complete tape library so that

when a specific file does need to be retrieved, the backup system will consult a data base to automatically load the latest backup of the file.

Remember, no matter what technology you choose to backup your system, it only works as well as your procedures. Back up often, back up everything, and check your backups to make sure they are done correctly and consistently! Δ

### Figure 3: For more on backup technology

Bluford, Parris, et. al, "Deciding Which Helical Scan Tape Technology Is Right For You," *Computer Technology Review*, July, 1990, pp 75-78.

Glass, L. Brett, "Reeling In The Data," *BYTE*, May, 1990, pp 299-306.

Helsel, Mike, "Data Cassette Technology Still A Contender For Data Backup, Archival Storage," *Computer Technology Review*, July, 1990, pp 67-72.

Stone, M. David, "QIC 150 Tape Drives: The Rising Star for Backup," *PC Magazine*, October 16, 1990, pp 269-340.

Sullivan, Kristina, "Tape Backup Formats Offer High Capacities," *PC Week*, June 11, 1990, pp 91-92.

All vendors interviewed stressed support as a reason to do business with them.

### What's coming

The trend in backup technology will continue to be increased capacity, increased speed, and decreased cost. Both 4 mm and 8 mm technologies will expand to 5 GB. Some of the schemes used to accomplish this increase will also increase data transfer rates. Big increases in device capacities come from stackers that combine several cartridges into one device. Some of these devices are available now, and will become more common.

Because of the increase in disk space used by any given system (whether a single CPU or a network), there will probably be a fundamental change in the way backups

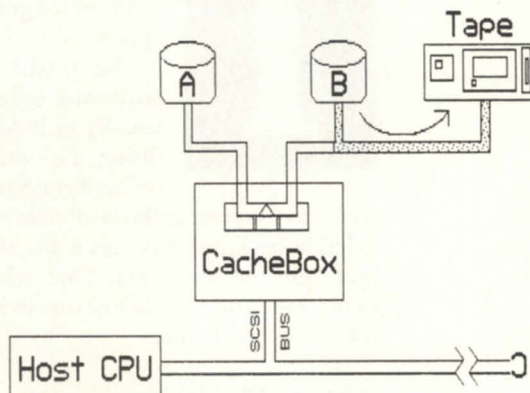
*Sue Dintelman is CEO of DMS Systems. She may be reached at 1111 Brickyard Rd., Salt Lake City, UT 84106; 801/484-3333.*



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# Never say shutdown



by Dale S. Lloyd  
Special to Focus



The threat of disk drive failure and subsequent loss of data can be a recurring nightmare for users of a data management system.

The traditional software solution usually includes auditing (i.e., logging for hard crash recovery),

and frequent archives of data bases. Reliable backups may mean the difference between hours and days when it comes to restoring data lost due to hardware or media failure.

## Enhanced DG/SQL

Data General's relational data base management system, DG/SQL, creates backups with the ARCHIVE\_DATABASE command, and when needed, reloads them using the LOAD\_DATABASE command. The major drawback of this archival method is that no transactions may be active, all users must be detached, and the data base itself must be locked in order for a consistent backup to be made. With rev 5.00 of DG/SQL, backups may be performed without the above limitations.

The new ONLINE\_BACKUP command (and the corresponding LOAD\_ONLINE\_BACKUP) provides rev 5.00 with a mechanism for backing up data bases concurrently with active users performing general transactions. This aspect effectively eliminates the downtime required for backups, and leaves the data base available while dumping data base files and associated audit files (known as REDO logs in DG/SQL). The fact that a shut-

down of the data base is no longer required makes this feature particularly advantageous to 24-hour systems that access data bases around the clock. Concurrent backup may also be useful in 9-to-5 environments that currently perform backups before or after normal business hours.

Since on-line backups have far less impact on normal processing than do conventional archives, they may be performed more frequently. A smaller interval between backups will reduce the number of audit files that must be retained, and thereby lessen the time required to perform hard crash recovery. The latter may be an important advantage to highly available applications that want to minimize downtime due to media failure.

## ONLINE\_BACKUP

The ONLINE\_BACKUP command allows DG/SQL to recognize that the actual data in the data base may be changing rapidly even as the data base files are being archived. The system handles this situation by determining which audit files contain modifications to the data base as it is being dumped. Since the log flushing in DG/SQL is optimized for high performance, it is likely that the required audit files will include logs written to before the ONLINE\_BACKUP command is issued. The system monitors transaction activity during the on-line archive and marks the end of the REDO log set when the longest running update is finished. Note that during this time a full range of normal transaction operations are allowed. These include commits, rollbacks, and the start of new transactions, as well as data base attaches, detaches, and administrative functions.

## SYNOPSIS

The new ONLINE\_BACKUP feature in revision 5.00 of DG/SQL allows archiving of data bases while users remain active.



The set of required audit files is an integral part of the concurrent backup system. By itself, the on-line archive is an inconsistent view of the data base. It is like a snapshot taken of a moving target that requires a set of REDO logs to bring the data base back into focus. For this reason, auditing must be enabled to use the ONLINE\_BACKUP command, and care must be taken to retain those audit files that are needed to bring the archive to a consistent state.

The ARCHIVE\_LOG, a user-readable file in the audit directory, contains information about the archive, and records the log tags of the relevant audit files. It lists the type of archive made (i.e., either NORMAL or ONLINE), the pathname of the data base, the date and time the archive was taken, the REDO log tag number for the first audit file required for hard crash recovery, and, in the case of ONLINE\_BACKUP, the number of the last REDO log required to bring the data base forward to a consistent state. Following an ONLINE\_BACKUP, the required set of

audit files should themselves be archived using the ARCHIVE\_REDO\_LOGS command.

### Planning for a nightmare

If a hardware or media failure requires the loading of an archived data base, the procedure for on-line archives is similar to that of more traditional backups. The user first issues the LOAD\_ONLINE\_BACKUP command to reload the dumped data base. If all of the necessary audit files (i.e., as indicated in the ARCHIVE\_LOG) are not present in the audit directory, they are loaded using the LOAD\_REDO\_LOGS command. At that point, the user issues a ROLL\_FORWARD\_DATABASE command. Once the on-line archive has been rolled forward past the last log needed for consistency, the operation continues in a manner identical to that for an archive created using the ARCHIVE\_DATABASE command. In many respects, the ONLINE\_BACKUP and LOAD\_ONLINE\_BACKUP commands function very

much like the ARCHIVE\_DATABASE and LOAD\_DATABASE commands. Labeled tape capability, the handling of data base files not contained within the data base directory, and the ability to dump data bases that span multiple disks are important features common to both archival methods.

We all hope that head crashes and malfunctioning disk controllers are few and far between, but data base backup and audit file logging provide ways to salvage these situations if they do occur. With the introduction of on-line concurrent backup in rev 5.0 of DG/SQL, and more DG/SQL enhancements expected in a Spring 1991 update, the options for providing hard crash recovery capabilities reduce impact on users, and push back the threat of nightmare. Δ

*Dale S. Lloyd is a senior software engineer with the DG/SQL development group. He has developed software for seven years, primarily in the backup and recovery subsystems area.*



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# What's your problem?

## SYNOPSIS

*At Data General's Research Triangle Park (RTP), committees do their best to handle requests for enhancement to products. Your requests will be filled more efficiently if you abide by the following.*

by Bill Cole  
Special to Focus

You've submitted a Request For Enhancement (RFE) to Data General, and now you're waiting for an answer. Did you ever wonder how RFEs are handled in the data management product area? Does anyone really look at them? Does anyone care? Let me share with you a case study to help you better understand our methods and rationale for answering RFEs.

The process in data management is simple. A product committee is assigned to each product. The product committee includes representatives from development, support, qualification, marketing, and documentation. The committee also includes individuals from the various support centers as "friends of the product" when additional information is required. A committee looks at every RFE, debates its merits and implications, and then formulates an answer. Sounds simple so far, right? It's that bit about debating merits that gets sticky.

If the RFE contains a problem statement, we can address the problem within the context of the whole product. The committee may offer alternative methods of addressing the problem rather than a simple "yes" or "no". However, if the RFE asks us to "just put these three lines of

code in Infos (or SQL or TPMS) and I'll be happy forever" without a problem statement, your answer probably won't be very satisfying. Without a problem statement, we have to invent reasons for the request. This leads to a session of reverse engineering. "Let's see, if the product did A, then the user could do B. But why would they want to do that?" It's not always easy to build a valid reason.

## It's like this

The following concerns a real AOS/VS Infos RFE. (I won't give out any more specifics since this could be embarrassing.) The dialog between the product committee and the submitter lasted more than a year—even after the STR was closed!

*Request:* Allow COMLOG logging in Infos without requiring the use of differential file mode.

*Answer:* No.

*Reason:* To allow this would be unsafe. One of the functions within IRECOVER is to stop processing after the last checkpoint and terminate the recovery process at that point. Without the safety of the checkpoint (a "known good point"), IRECOVER could be inducing logical errors into a data base. By the way, it took the committee about an hour to come to this conclusion because the decisive issue wasn't apparent at the outset.

*Cause of the request:* Performance with differential files.

*The rest of the story:* It seems that each user process opens approximately 100 Infos files in the application at one time. Well, this changes the picture pretty drastically. The problem has nothing at all to do with logging, and everything to do with application and file design. Infos opens a large number of data bases per



## How to submit an RFE

by Lori Rhea DiSorbo  
Focus staff

An RFE, or Request For Enhancement, is similar to a Software Trouble Report (STR). However, where an STR reports a product malfunction, an RFE suggests that a new function be *added* to a product. Approximately 15 percent of all product queries turn out to be RFEs, according to Data General. That amounts to about 450 RFEs per year.

Customers can submit RFEs to one of Data General's STR processing centers. In the U.S., the requests go to DG's Norcross, Georgia office. Each country has its own center. Requests can be sent either by phone or letter, and are recorded by support representatives. The requests

are then assigned to specific product teams that examine the RFEs.

Team assignments depend on what product is involved. The location of the team varies depending on where the product is developed. The designated team studies the RFE, and in approximately a month, decides whether or not implementation of the request would be beneficial to the product.

Once the team decides what to do about the RFE, it informs the submitter of the request. If the team decides to pursue the enhancement, further study and development take place. The extensiveness of RFEs varies greatly, as does the time it takes to implement them.

If you have a Request for Enhancement you'd like to submit, contact DG's STR Processing Center, 1626 Jeurgens Court, Norcross, GA 30093; 1-800/DGHELPS.  $\Delta$

process (512), but AOS/VS doesn't support having that many channels open; so Infos uses a round-robin workaround. (Note: the minimum number of channels would be 2,048—one for the data file, one for the index file, and one for each of the differential volumes.) That is, we open data bases until we reach a pre-defined limit and then start transparently closing/opening data bases as each is referenced.

Now, with 100 files and no check pointing, the user never encountered this phenomenon, but turning on check pointing caused Infos to require more open channels than the Infos limit, and we got into the channel swapping dilemma that in turn causes some performance degradation.

*Alternative:* Given this kind of information, you can quickly see an alternative request. Let the user configure the maximum number of channels that Infos will use before going into the channel swapping described above. Well, that's an entirely different issue and should be submitted as an RFE.

### Moral of the story

Tell us what business problem you're

trying to solve and let us address that problem. It is our goal to help you solve your business problems, but we can do that only when we know what the problem is.

The issue the product committees try to deal with is whether a request is good for a product's user community, or is it going to present problems for some installations while helping others? We've met a number of users to discuss various issues and address wish lists during the five years that I've been at RTP.

One thing that always impresses me is the ingenuity of our users. You make our products do things we hadn't considered, so our reverse engineering sessions sometimes don't include sufficient information to make a good decision about a particular request. If your favorite request for enhancement has been turned down, please write me in RTP describing the problem you're trying to solve. I promise to get back to you.  $\Delta$

*Bill Cole is the manager of Data Management Qualification and Support for Data General. He may be reached at Data General Corp., Research Triangle Park, 62 Alexander Drive, Durham, NC 27709.*

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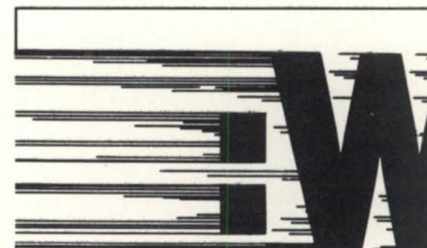
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# Managing for growth

**SYNOPSIS**

*When data processing is used effectively, everyone benefits. The key is to have your end-users and software writers support each other during the development process.*

by Steve Handlos

and

by Liz Straus

Computers have evolved since their introduction in the 1950s. Where they were once experimental, they are now a strategic part of each major company's success. Your company's computers must work effectively if your company is to grow and prosper. To continue your success, you need a data processing strategy that can continue this growth.

**The setting**

How data processing is positioned in the company is important to the company's profits and the CEO's peace of mind. If the responsibility for data processing is delegated to an effective manager, problems never develop over priorities or system specifications. Whether problems develop depends on how well the manager recognizes users' priorities and company requirements.

Politics can develop when the people involved do not understand their roles in the software development process. Users and programmers often develop conflicts over why projects are late, or why systems do not perform as they should. These issues must be addressed by the CEO when it becomes clear that the people cannot resolve their own conflict and/or data processing cannot meet the needs of the company.

**The users**

Users frequently resist software development because of its direct impact on them. They fear that the programs won't work, or won't be maintained in the future as conditions change. Their ability to perform will be impaired in either case.

These fears are likely to persist until the users understand the development process, and the role they play. Without this understanding, they are likely to protect themselves by introducing a steady stream of specification changes. A few simple but key specification changes can easily postpone the project until retirement or promotion. These changes are introduced with increasing frequency near the end of the project, when the user is finally faced with the dilemma of using the software.

Yet, users' resistance will disappear when they get what they want. In fact, a happy user will support data processing progress.

**Data processing**

Data processing professionals love to write software and run computers to help others. They concentrate on learning technical skills to the exclusion of people skills. Sometimes they can become enamored with the technology, and forget that they are there to solve user problems. They can



avoid this by listening to the needs of the users, and providing them with the results they want. Data processing is a service organization that thrives when its customers are satisfied.

Satisfied customers are a pleasure to work with. The more people data processing satisfies, the more important the computer becomes in supporting the organizations' growth.

#### CEO viewpoint

Very few CEOs come from a data processing background. CEOs normally don't want to be involved in data processing. They know data processing is necessary. They know it's a cost. They want it to run smoothly for their benefit and the benefit of the company. They know that if they have to get involved, significant losses have already occurred and significant opportunities have already been missed.

A peaceful, smooth running organization allows CEOs to spend time doing what they are supposed to do.

#### Opportunities

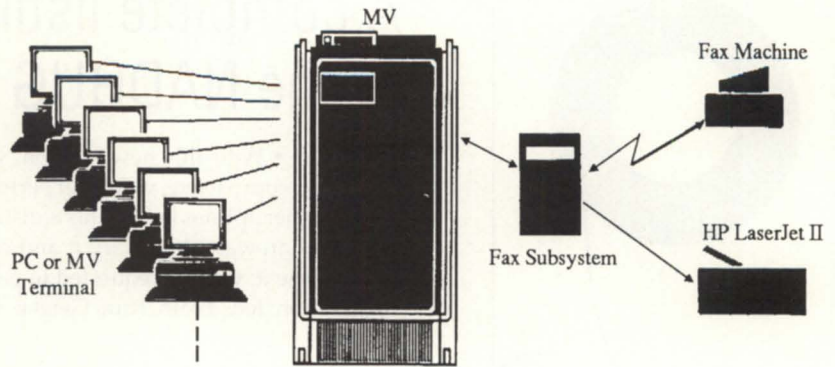
In the well managed company, the users and data processing people are trained and know their roles. These companies develop software more quickly, at a lower cost, and gain an advantage over the competition that results in higher market share and profit. This is the data processing opportunity. In today's business climate, effective data processing is a competitive tool.

Recognize your opportunity. Recognize the impact that data processing can have on your organization. Take the steps you need to take to ensure that new systems, which improve your company's competitive position, are completed on time and on budget. By doing this, you minimize the cost of development and speed the enjoyment of the systems's benefits. When you make it work, the CEO and the users will recognize the importance of the computer and your ability to use it for the benefit of the organization. △

*Steve Handlos is the president of Productivity Development Systems Corp. and Data Safe Corp. He may be reached at P.O. Box 1931, Summerville, SC 29484-1931; Liz Straus is president of Stewart & Associates, Inc., P.O. Box 11944, Columbia, SC 29211; 803/771-4636.*

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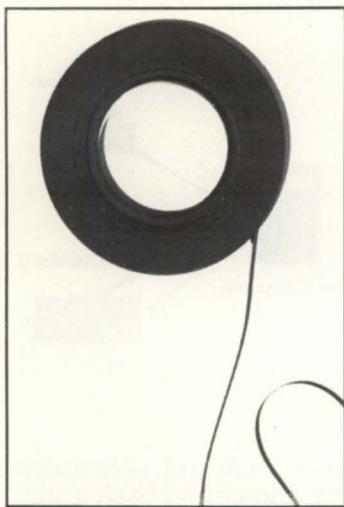
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## A complete listing of the NADGUG software library

**ACK** • Updated version 1.70. Terminal emulator/file transfer program for both AOS/VS and AOS machines. 365 blocks.

**Big Brother** • Automatic log-off program written in Fortran 77. Donated by the U.S. Forest Service. 169 blocks.

**B.J.'s BBS contributions** • About 20 items, including various programs, documentation, and macros. Some of the more interesting items include the :SYSMGR benchmark suite, a continuous incremental backup, a clean-up file maintenance program, a program to find strings in files, and a type-backward program. 6,761 blocks.

**CRREDIT** • The old RDOS screen editor ported over to VS. 49 blocks.

**DBCHECK** • Checks the open status of an Infos file and examines the checkpointing status of a file. 187 blocks.

**DUMpload** • A Macintosh program to dump and load AOS/VS-compatible dumps on a Macintosh. 137 blocks.

**ERP** • A process-termination program developed by NASA and modified by Manville. In Fortran 77. 454 blocks.

**FILEMNGR** • With this new version, you can move, copy, delete, view, and perform several other options faster. This is distributed as shareware. If you try it and continue to use it, you are requested to pay a registration fee. From Kim Geiger. 654 blocks.

**Focus** • *Focus* magazine articles. 1,774 blocks.

**FTNCVT** • A translator to convert Fortran 5 to Fortran 77. 232 blocks.

**Games** • A collection from various places. Enjoy. 19,216 blocks.

**IMSLUTIL** • A collection of CLI macros, Cobol routines, and assembly routines callable from Cobol. By IMSL of Houston. 4,893 blocks.

**JAG\_UTIL** • JAG\_UTIL by John Grant consists of several programs: Filecount, User-space, Scan, Glossary, Laminate, and Qhelp. 4,325 blocks.

**Kermit** • A file-transfer protocol developed at Columbia University. 9,697 blocks.

**Logout** • Another auto log-out system. 178 blocks.

**Look** • Used to view text files, Look allows you to move forward and backward in a file. Donated by Data General. 202 blocks.

**Macros** • A collection of macros from various sources. 441 blocks.

**MENUDIR** • An initial user menu that can chain to other applications and features a password-control system. From the Fed SIG. 486 blocks.

**Misc Kerm** • An expanded version of AOS Kerm, this now includes other versions of Kermit including DG/One Kermit. 6,709 blocks.

**MS-DOS** • A VS program that lets you read and write MS-DOS diskettes on an MV system with a 5.25-inch floppy disk drive. 984 blocks.

**Notify and Prior** • Two contributions from Concept Automation. Notify tells you when a process has terminated. Prior lists the priorities of processes. 162 blocks.

**RDOS Kermit** • Now available. You must request the Kermit tape (rather than the library tape) to get RDOS Kermit.

**Softrans** • A file-transfer protocol written in Fortran 77 used to communicate with proprietary PC communications packages. 462 blocks.

**Spell** • Checks the spelling of a word or spell-checks documents. Submitted by Richard Kouzes. 5,108 blocks.

**TEX** • Version 2.26a is now available. TEX (Terminal Emulator with Xmodem) is a terminal-emulation program written by David Down. He has revised the TEX software to include a command language. TEX is distributed as shareware. At the end of 30 days, either remove it from your system or send the author a \$45 fee. 463 blocks.

**VT100KER** • VT100 emulator from John Grant. 1,043 blocks.

**Xfer** • A tape-conversion utility. 607 blocks. Δ

**All NADGUG members interested in receiving the NADGUG software collection should send a 1,200-foot tape to:**

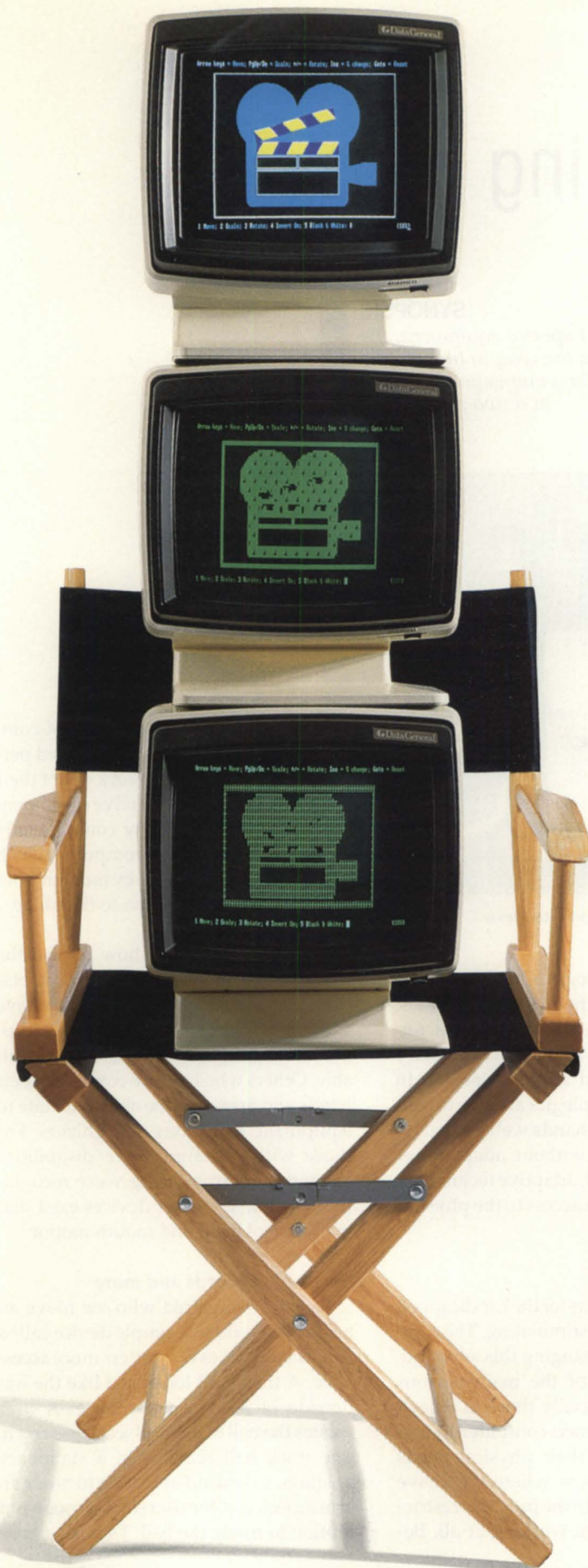
Randy Berndt, Building 4, Suite 321, 5300 North Braeswood, Houston, Texas 77096

MV/2000 and MV/1400 users should send one formatted, error-free tape cartridge. Software contributions should be sent to the same address. Be sure to include your membership number. Allow 4-6 weeks for delivery.

Thanks to Brian Johnson and :WFFCA, the library is now able to provide 1200 ft. copies to AOS/VS rev 6 users. Thanks to Kevin Danzig for duplicating MV/2000 tapes. To leave a question regarding non-standard library distribution call 713/988-5342.

Please include a self-addressed envelope with sufficient return postage. In compliance with postal regulations, do not date the postage. Either disable the date printing completely, or set the date to "--" or zeros. Tapes cannot be returned UPS collect.





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# Bridging gaps

**SYNOPSIS**

*With portability and special equipment, the computer industry leads the way in helping the motor-impaired find fulfilling employment. Part II in a two-part series.*



*Headmaster turns your head into a computer mouse.*

by Lori Rhea DiSorbo  
Focus staff

In a world of physical objects, those unable to master touch-sensitive tools are quickly excluded. Physically handicapped persons struggle daily with this barrier. In December, we discussed the problems facing visually and hearing-impaired people in today's world—especially the challenge of securing fulfilling employment. This month, we take a look at adaptive computer technology that allows the motor-impaired to lead more independent and satisfying lives.

**Motor-impaired**

"For those unable to use limbs, or to get out of a wheelchair, finding successful employment is a particular challenge," says Dr. Bud Rizer, director of the Technology Resource Office (TRO) of the Maryland Rehabilitation Center. However, he is optimistic about the opportunities facing the motor- or movement-impaired because, according to Dr. Rizer, modern technology can adjust to fit the needs of most individuals.

A variety of physical handicaps exist, usually as a result of disease or accident. One form of motor-impairment we often vi-

sualize is quadriplegia. Quadriplegia is an impairment of the upper extremities. So, for example, the disability of one finger as a result of a spinal cord injury would be classified as quadriplegia. In many cases, quadriplegics are able to control their arms and hands well enough to utilize equipment without adaptations. For those who can't, adaptive technology provides them with access to the physical world.

**Bridging the gap**

Historically, careers for the handicapped have been less than stimulating. The computer industry is changing this situation. Portability is one of the main reasons handicapped (especially those in wheelchairs) have welcomed computer-industry careers. Often their physical needs confine them to home where they have special equipment. In the past, this restriction kept them from working at all. Be-

cause of the portability of computers, many more disabled persons are able to work out of their homes. Most adaptive equipment will work on any commercially available microcomputer which can then hook up by modem from a satellite location to the office.

Depending on how severe the motor-impairment is, different adaptations are available. For those who have some amount of motor ability, equipment such as special keyboards are available. Others who have no control of their hands and arms may be able to dictate to equipment with voice recognizers. For those with communicative disabilities barring them from using voice recognition technology, other devices exist that make use of head and mouth motion.

**Special keyboards and more**

For those impaired who *can* move an arm and shoulder, a simple device called a track ball makes computers more accessible. A track ball looks just like the underside of a computer mouse. A user rotates the ball to move objects on-screen. The track ball remains in a stationary position, so instead of having to move an arm repeatedly, the user simply uses hand motion to rotate the ball. The ball can be



mounted at any angle or position so that it is within reach of the person.

Two software products exist that make using the keyboard more feasible—word prediction and abbreviation expansion. Word prediction software lets users type a single character or set of characters, and the program guesses (based on preprogrammed algorithms, operation to speech, predictability to character sequence, etc.) what word is wanted. When the correct word appears in a window on screen, the user stops the search, and the remainder of the word is typed out, including a space bar. One notable requirement of this product is fast visual scanning.

Abbreviation expansion is a type of computer shorthand. The user encodes computer software with an abbreviated version of frequently used words such as "t" for "the", and "edu" for "education". Standard version abbreviations exist if users choose not to design their own. This process does require memorization, but research from the Maryland Rehabilitation Center shows that recall ability is a minimal issue. People remember the code with 90 percent accuracy. Prediction and abbreviation expansion cut down considerably on time and energy needed to create a document.

### Using your head

As with blind computer users, voice recognition adaptations are a feasible option for some motor-impaired people who cannot use hands and arms. The voice recognizer translates an analog signal (a continuous measure of sound in this case), to digital format that the computer can interpret. The computer matches the pattern of the digital signal to word patterns, and displays the words on screen.

Dragon Dictate is a recognition system made by Dragon Systems, Inc. Whereas older speech recognition systems required the user to speak with about two pauses between every syllable, Dragon Dictate allows for more continuous speech with only a slight pause every two syllables. The down side is that the system is very expensive, and it requires a 386 based 25 MHz computer.

Dr. Rizer says that voice recognition is not for everyone. Speaking for long periods of time is extremely tiring. Also, although recognition systems do not require perfect speech, some motor-disabled

have communicative impairments that limit them from using it.

Another alternative for accessing the computer is Headmaster by Prentke Romich Company. This new device looks like an operator's headset. Headmaster turns your head into the computer mouse. The cursor follows any direction you move your head: left, right, up, down. Attached to the headset, right in front of

your lip is a hollow tube where a microphone might be. When air is sipped through the tube, it clicks the mouse. To initiate individual keys on a keyboard, software displays a visual image of a keyboard in the lower part of the screen. (See photo.) The user simply moves the cursor to a "key" and sips. Though Headmaster is not very fast, it is the only current alternative for some severely disabled.

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## Making it work

As Dr. Rizer states, "enhancement techniques take a person's overall rate of work, and find a way for them to put out the same amount of energy, but increase the product." His success stories are real. He proudly relates a case where a student with muscular dystrophy came to him only able to type at a keyboard for 20 minutes before being exhausted for the

rest of the day. With a modified keyboard called the Magic Wand—made the size of a postcard and used with a stylus to punch the keys—the student only had to move his fingers, and as a result, could type for six hours, practically a full working day.

Dan Neff is another success story. He is a quadriplegic who, after going through rehabilitation, found productive employment in the computer industry. He works

for Public Works Canada, a large DG installation. Neff is systems officer for realty services, and manages the microcomputers in the realty section. He also provides technical support such as setting up hardware and software. To accommodate his lack of hand coordination, he uses "splints for banging away at keyboards," as he puts it. The splints are attached to his arms with velcro straps. He claims his typing is as fast as anyone typing with one finger. Neff agrees with many other disabled computer users that the computer industry has become one area of stimulating work available to all, regardless of impairments.

## Change—slow but sure

With time, hopefully we will see a trend toward positive situations like the one facing Dan Neff. Though Dr. Rizer is pleased with advances in adaptive technology over the last five years, he warns that knowledge of individual needs is very important in prescribing equipment. "If properly prescribed, the majority of disabled should be able to take advantage of adaptive equipment," he says. "But if adaptive technology is improperly prescribed, it is no better than no technology at all."

Part of the struggle with placing adaptive technology with more disabled users is funding. Though federal dollars exist, they are typically hard to come by. The Office of Special Education and Rehabilitative Services (OSERS) funds only seven of every 300 proposals submitted.

Nonetheless, there are encouraging changes for handicapped taking place in the federal government. One recent example is a United States Congress amendment to the Vocational Rehabilitation Act of 1973—it puts pressure on computer vendors to include hooks for adaptive equipment in their computer packages. Hopefully vendors will graciously respond to that pressure.  $\Delta$

*If you are interested in finding out more about adaptive technology or programs for the handicapped, call the IBM National Support Center for People with Disabilities in Atlanta, Georgia, at 800/426-2133, or the University of Wisconsin's Trace Center at 608/262-6966. For information on other groups researching rehabilitation technology, call RESNA in Washington, D.C. at 202/857-1199.*



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# Make your COBOL move

## SYNOPSIS

*There are quick and easy ways to bring your Cobol processing up to speed. Four revealing tests demonstrate which ones yield the greatest reduction in elapsed time and CPU time.*

### :COBOL:ZIPPY

This month, I examine how fast a typical Cobol program can run after applying some simple speed-ups.

When investigating potential speed-ups, use the tiniest possible research program as a vehicle. Figure 1 shows the program template I used. For the test, I used Cobol rev 3.50, LANG\_RT rev 3.53, and AOS/VS 7.67 running on an MV/4000 with hardware FPU. The system was patched with DG's "optional" 7.67 buffer flush patch to avoid unnecessary I/O. The disk involved was a Fujitsu 3333 on a Zetaco BMX-3 controller, emulating a 277 MB Zebra disk. All references to the Cobol manual involve DG p/n 093 000289 02, as amended by the 093\_000289\_02 doc change file (found on the Cobol 3.50 release tape).

### :BLOCK\_CONTAINS

One of the most simple and obvious speed-ups involves the optional BLOCK CONTAINS n CHARACTERS, or BLOCK CONTAINS n RECORDS clause in the file's File Description.

The Cobol manual is a bit confusing on the BLOCK CONTAINS clause. The table

of defaults on page 55 indicates that the default block size is one record, and the maximum size is "<32768". The doc change file makes no correction to this page, but it does mention—in a correction to Appendix E, and in the new Appendix H documentation—that the actual limit is 65,534.

Page 58 of the manual contains a prose description of the BLOCK CONTAINS clause. However, in the doc change file, the paragraph has been replaced with:

**"The block size is equal to the number of characters specified in lit-4. If lit-4 is less than or equal to 2048, Cobol uses 2048 as the blocksize; otherwise Cobol uses 4096 as the blocksize. If you omit this option, the default size is 2048 characters, except for tape files.**

**"Infos always uses a block size of 2048 or 4096, while printer files default to a block size of 2048. The block size for tape files is equal to the record length if the record length is even, otherwise the block size is the record length plus one."**

I don't know who wrote those paragraphs, but they obviously didn't check with the people who wrote the Cobol runtime libraries. A check of my test programs with the debugger showed that the default block size is one record, and there is no cap at 4096 bytes. The 2 KB versus 4 KB sounds suspiciously like something related to Infos' 2 KB/4 KB page size option—not something having to do with flat files. A default of one record makes perfect sense for randomly accessed files, but is an appallingly bad choice for sequential files.

The general rule for accessing disk files is to get as much use out of each disk access as possible.

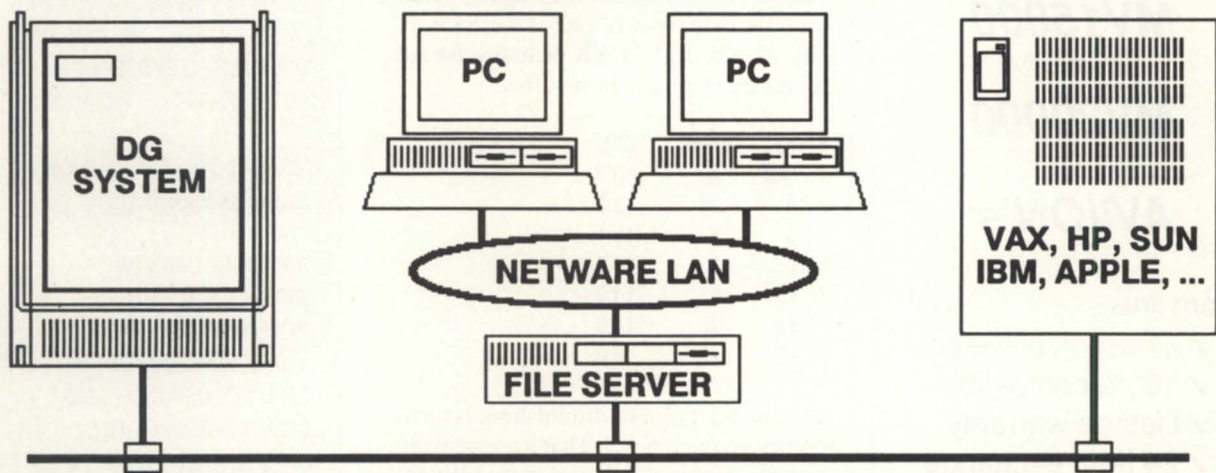
With random files, using a BLOCK CONTAINS of more than one record wastes time. Additional records beyond



**Figure 1: TEMPLATE.COB**

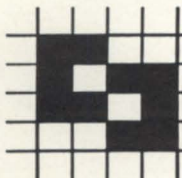
<p>IDENTIFICATION DIVISION. PROGRAM-ID. TEMPLATE. AUTHOR. BJ.</p> <p>ENVIRONMENT DIVISION. INPUT-OUTPUT SECTION. FILE-CONTROL. SELECT PRINT-FILE, ASSIGN TO PRINTER "SML9102.PRT".</p> <p>DATA DIVISION. FILE SECTION. FD PRINT-FILE. 01 PRINT-REC PIC X(136).</p> <p>WORKING-STORAGE SECTION. 77 COB-RUNTM PIC 9(4) COMP VALUE 24. 77 AC0 PIC S9(9) COMP. 77 AC1 PIC S9(9) COMP. 77 AC2 PIC S9(9) COMP.</p>	<p>77 IER PIC S9(9) COMP. 01 RUNTM-PACKET. 05 ELAPSED-SECS PIC S9(9) COMP. 05 CPU-SECS PIC S999999V999 COMP. 05 I-O-BLOCKS PIC S9(9) COMP. 05 PAGE-SECS PIC S9(9) COMP. 01 RUNTM-DISPLAY. 05 ELAPSED-SECS PIC ZZZ9. 05 CPU-SECS PIC ZZZ9.9. 77 CLI-CMD PIC X(250).</p> <p>PROCEDURE DIVISION. EXPUNGE PRINT-FILE. MOVE "CREATE/ELEM=4 SML9102.PRT" TO CLI-CMD. CALL "CLI" USING CLI-CMD. OPEN EXTEND PRINT-FILE. MOVE "TEST" TO PRINT-REC. PERFORM PRINT-TEST-LINE 5000 TIMES. CLOSE PRINT-FILE.</p>	<p>PERFORM SHOW-RUNTIME. STOP RUN.</p> <p>PRINT-TEST-LINE. WRITE PRINT-REC.</p> <p>SHOW-RUNTIME. MOVE -1 TO AC0, MOVE 0 TO AC1. CALL "?CBADDR" USING RUNTM-PACKET, AC2. CALL "?CBSYS" USING COB-RUNTM, AC0, AC1, AC2, IER. MOVE CORRESPONDING RUNTM-PACKET TO RUNTM-DISPLAY. DISPLAY "Elapsed: "ELAPSED-SECS OF RUNTM-DISPLAY. DISPLAY "CPU: ", CPU-SECS OF RUNTM-DISPLAY.</p>
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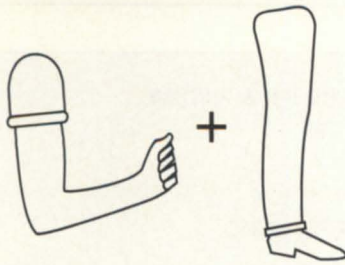
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## SYSTEM MANAGER'S LOG

the one you want are read, with little likelihood that your next read will involve the next few records. The result: extra memory is consumed unnecessarily for the larger buffer, and average disk access times are longer due to the extra data read.

In the case of sequential files, the bigger the BLOCK CONTAINS, the faster the program runs. However, the increased buffer size that results translates directly into a larger working set size for your programs. This, in turn, translates into fewer users before memory contention sets in. With batch programs that run when on-line user load is nil, the memory consideration can be safely ignored (the batch program has the machine to itself).

As with any buffering scheme, there is a point of diminishing returns for buffer size versus program speed. The only way to find the point of diminishing returns is to try a range of buffer sizes, and look for the buffer size beyond which there is little gain in overall program speed.

Using the template program, I created seven programs to test the effect of various block sizes using a fixed element size of 4 for the output file (the same element size that results if using OPEN OUTPUT instead of CREATE and OPEN EXTEND). The seven block sizes I tried were default (one 136 byte record), 2 KB, 4 KB, 8 KB, 16 KB, 32 KB, and 64 KB (actually 64 KB minus 2). Here are the results:

Blk sz	Elaps	CPU
136 KB	47	16.9
2 KB	24	15.3
4 KB	23	15.1
8 KB	23	14.9
16 KB	23	14.9
32 KB	23	14.8
64 KB	23	15.0

Clearly, the point of diminishing returns occurs at about 8 KB. That's a nice comfortable number; it causes very little increase in the working set size unless you have 20 or 30 sequential files open.

### :ELEMENT\_SIZES

Now that we've optimized the buffer size, the next step is to see what effect cranking up the element size of the print file has on the disk access rate. To test this, I modified the 8 KB version of the above test program to do a CREATE/ELEM=16. I obtained the value of 16 by taking the size of the print file, 690,000 bytes, and

Figure 2: Best case

```

IDENTIFICATION DIVISION.
PROGRAM-ID.        BEST CASE.
AUTHOR.           BJ.

ENVIRONMENT DIVISION.
INPUT-OUTPUT SECTION.
FILE-CONTROL.
  SELECT INPUT-FILE
    ASSIGN TO DISK "SML9102.PRT",
    RESERVE 1 AREA.
  SELECT OUTPUT-FILE
    ASSIGN TO DISK ":DISKB:SML9102.OUT",
    RESERVE 1 AREA.
I-O-CONTROL.
  SAME RECORD AREA FOR
    INPUT-FILE, OUTPUT-FILE.

DATA DIVISION.
FILE SECTION.
FD INPUT-FILE
  BLOCK CONTAINS 118 RECORDS,
  LABEL RECORDS ARE OMITTED,
  MULTIPLE I-O PROCEDURES.
01 INPUT-REC      PIC X(138).

FD OUTPUT-FILE
  BLOCK CONTAINS 118 RECORDS,
  LABEL RECORDS ARE OMITTED,
  MULTIPLE I-O PROCEDURES.
01 OUTPUT-REC    PIC X(138).

WORKING-STORAGE SECTION.
  (same as Figure 1)

PROCEDURE DIVISION.
EXPUNGE OUTPUT-FILE.
MOVE "CREATE/ELEM=16
  :DISKB:SML9102.OUT" TO CLI-CMD.
CALL "CLI" USING CLI-CMD.
OPEN INPUT INPUT-FILE.
OPEN EXTEND OUTPUT-FILE.
PERFORM COPY-RECORD 5000 TIMES.
CLOSE INPUT-FILE, OUTPUT-FILE.
PERFORM SHOW-RUNTIME.
STOP RUN.

COPY-RECORD.
  READ INPUT-FILE.
  WRITE OUTPUT-REC.

SHOW-RUNTIME.
  (same as Figure 1)
    
```



dividing it by 512 and 128. That resulted in an element size of 10.5 blocks. Rounding up to the next multiple of the BLOCK CONTAINS size (8 KB, or 16 blocks) suggests an element size of 16. The results for this run were:

Blk sz	Elaps	CPU
8 KB	20	14.9

We reduced the number of cache searches performed by the system. The CPU for the cache searches is not fully charged to the process, so CPU consumption in this case went down by less than 0.1 seconds. The moral: element size has only a slight effect on sequential file accesses.

### :BUFFERED\_IO

Cobol is unique among DG's high level languages in that it has built-in facilities to do multi-tasked read-ahead and write-behind buffering of sequential files.

According to the new Appendix H, you need only the following to turn on buffered I/O:

```
RESERVE n AREAS clause
BLOCK CONTAINS clause
LABEL RECORDS ARE OMITTED clause
MULTIPLE I/O PROCEDURES clause
/TASKS=n switch on CLINK
```

If you use the n CHARACTERS form of BLOCK CONTAINS, and the value of n is not an exact multiple of the record size, the compiler advises you that using a multiple of the record size is more efficient. The doc changes also recommend specifying the largest number of records that fit into the maximum block size of 65,534. I think that's a bit overzealous in terms of memory consumption, but the minimum you should specify is two times the number of records that will fit into 8 KB. That's because the buffered I/O routines split your block into two buffers (or is it n buffers? Appendix H doesn't say), and we want each buffer to be at least 8 KB long. That's the same 8 KB that we discovered above was the best balance between speed and memory consumption.

Note, the MULTIPLE I/O PROCEDURES clause is only documented in the new Appendix H, and only a passing mention is made of it there. Mention is also completely missing from Chapter 4.

See the doc change file for information on how many tasks to specify. I used

/TASKS=4, per the recommendation for programs with a single input and single output file, and that use/don't use Infos files (i.e., CLINK/INFOS=DUMMY).

Unfortunately, according to page 417 of the Cobol manual: "You cannot use buffered I/O with printer files."

Why this should be the case is a puzzle. Print files seem to be exactly the ones to benefit most from buffered I/O due to the way Cobol's runtime libraries currently implement printer output. For some reason known only to the Cobol group, a WRITE to a print file generates either two or three ?WRITE system calls: two if you specify AFTER ADVANCING 1, three if you specify BEFORE ADVANCING 1. The first ?WRITE writes the actual data record, the second writes a single carriage return, and the third writes the line feed. Making an entire round trip through the AGENT just to append a carriage control character is an incredible waste of CPU. It explains why PERFMGR showed all of the test programs consuming the bulk of their CPU time running ring 3 code.

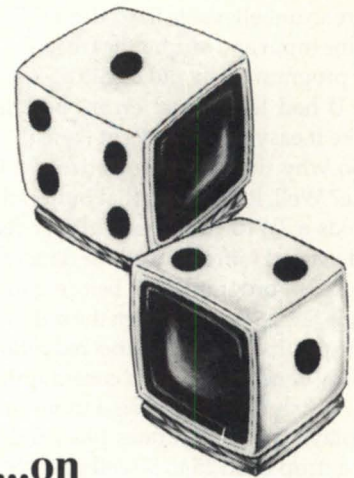
To test the actual effect of Cobol's buffered I/O, I hacked up a copy of the template program. I copied the print file created by the previous tests to a new file on a different disk unit using fixed length records of 138 bytes (136 + CR + LF). I used a different disk for the output file to make the results repeatable. If I had used the same disk for both files, the results would have been largely dependent on where the new output file was created on the disk, compared to the location of the existing input file.

The baseline version of this test uses input and output file element sizes of 4, no BLOCK CONTAINS, and no buffered I/O. In other words, it is coded just as any Cobol copy program would be. For the other versions, I used BLOCK CONTAINS 118 RECORDS ((2 x 8 KB) / 138), a 16 block element size copy of the input print file, CREATE/ELEM=16 for the output file, and a range of areas. The results for the five test cases were:

Areas	Elaps	CPU
0	66	19.5
1	8	5.1
2	8	5.1
3	8	5.1
8	8	5.1

When I first ran this test, the CPU results

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were so unbelievable that I did a FILCOM on the input and output files to make sure the program really did create and write a file (I had left out all error checking to make it easy on the folks at Focus).

So why the tremendous drop in CPU time? Well, it turns out that buffered I/O avoids a ?WRITE system call per record and instead buffers up all the data within the Cobol program itself before issuing a single large ?WRITE when the buffer fills. This results in a dramatic reduction in AGENT and system CPU consumption. If you watch the tests using a monitor that displays system call rates like I did, you see a drop from 25 to 30 calls per second, to 5 calls. Also, there seems to be little or no benefit in specifying more than one area, as long as you remember that it should be at least 16 KB.

## :SUMMARY

Adding a BLOCK CONTAINS 8192 CHARACTERS clause will greatly benefit you. In the printer output file test, this change resulted in a 51 percent reduction

in elapsed time, and a 12 percent reduction in CPU time.

Using large element sizes for sequential files has a relatively small effect—15 percent less elapsed time, and a tiny reduction in CPU time, but that's enough to make it worth doing.

With the addition of a few extra lines of code to turn on buffered I/O, the benefits are truly staggering—an 88 percent reduction in elapsed time, and a 75 percent reduction in CPU time versus having everything defaulted.

Using more than one area for buffered I/O yields no significant benefit.

Clearly, DG could help out a bit by doing three things: change the default buffer size to 2 KB as a minimum, eliminate the unnecessary one byte system calls used to add the terminator(s) when WRITEing to PRINT files, and fix the errors and omissions in the manual and the doc changes file that I cited above.

For your part, you need to change any of your programs that use sequential files. As a minimum, you should crank up out-

put file element sizes and specify 8 KB buffers. If you really want to go fast, specify a block size of at least 16 KB and use buffered I/O. Then just stand back and watch those Cobol batch jobs fly . . .

A complete copy of the test programs used for this column is available on the :SYSMGR BBS as item SMLOGS:SML9102X so you can try them on your own system. The item contains source programs, macros to compile them, a macro to run them, and a documentation file. Δ

*BJ is the President of B.J. Inc., a San Francisco based consultancy specializing in system auditing, system management, and performance analysis. :SYSMGR is a division of B.J. Inc. BJ can be reached at 109 Minna St., Suite 215, San Francisco, CA 94105, 415/550-1444 (voice) or 415/550-1072 (fax). The :SYSMGR bulletin board number is 415/391-6531 (300/1200/2400 with optional MNP class 5, CHAR | 6 0 5 X | CHARLEN = 8 /PARITY = NONE/AUTOBAUD) or 415/550-1454 (voice).*

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# Bits and bytes from the bulletin board

## Wordperfect user trap

From: Gail Heineman

We're experiencing problems with Wordperfect printing. For some reason we get the message "Printer #1 \*Terminated\* USER TRAP:" and then a long series of numbers. I called Wordperfect support, and they had me use WPGEN to recreate the printer drivers. After a lot of fiddling, it worked for a while when we had only one printer defined. Then it croaked again.

After deleting the printer and creating it again, it worked for about a day. It croaked again, and now I can't get it to go at all. The user trap message shows up about 2 seconds after starting up WPEXC. Anybody else seen anything like this? We're running 7.67 on an MV/9500.

From: Kevin Danzig

We had a similar problem. Check to see how much garbage you have in :WRDP:WQUE. Every time you kill a print job or a job doesn't complete correctly, a file is left, and they can become a big mess. If you are tight on disk space and want to print something that there isn't enough room for . . . bang!

Also, if WRDP:WQUE isn't a CPD, it might be in a CPD that is tight.

From: Gail Heineman

You're right—that fixed it! It turns out that after moving from 7.65 to 7.67, and changing from an MV/4000 to an MV/9500, and moving to a newer release of Wordperfect, something happened. At least one of the old files with font controls makes this user trap happen every time someone tries to print it. I have to clear out :WRDP:WQUE to get

rid of this poison file before WPEXC will run again.

## Locked IAC ports

From: Carlos Urrutia

Has anyone had IAC ports lock up on the MV? It happens to our system, and we can't disable or enable that console.

From: Terry Hubbard

Try CLEARDEV/RXON @CON?? from the master console, CLI PID 2.

From: Steven Bonici

It happens to us a lot. It could be a bad line, or the IAC is going. With us, most of the time it's just garbage in the line.

From: Mark Walters

Under 7.65 VS, there are some patches that you may want to install. We had problems with the IACs going out to lunch every couple of days. After installing the patches, it was fixed.

From: Philip McLean

Happened to us once and turned out to be the first stage of the IAC going bad. Good luck.

From: Carlos Urrutia

Two days ago the OP console reported a fatal AOS/VS error on an IAC. DG replaced that IAC today! Anyway, this problem has happened to us in the past when the IACs were working "fine". Thanks for replying to my message.

## Cobol functions

From: Dave Martin

According to the Cobol reference manual, function keys F10, F11, and

New Line generate the same return codes on a d200 or better. Is there any way in Cobol to specifically identify function key F11? We want our application programs to exit on F11 the same as CEO.

From: Doug Rady

There are some optional patches supplied with the Cobol compiler (with recent revs anyway) which allow F9, F10, and F11 to return the "normal" function key codes. They're named something like AV\_CO\_350\_PRG.00 and AV\_COB\_350\_CSL.04—the names of these patches for rev 3.50 of the AOS/VS Cobol compiler.

From: Walter Mosscrop

If you're using the shared library, there is a patch available for the library. Sure beats patching every program file. Also, check the release notices; they have the info on the patches. The patches are supplied with the revisions.

## Dial-in modems and an MV/15000

From: Freddie Chow

I am trying to connect a dial-in modem line for our MV/15000 mod 10. The modem I bought is a Racal-Vadic 2400LC. I genned the port for modem line, and I can call and log on the first time only. Once I log off, I can never log on again.

When I check the port in the MV/15, the message says "Modem disconnect in progress—cannot open @con7." (@con7 is the port the modem is connected to.) I have to unplug the line at the back of the IAC8 and CX ENABLE @CON7 to log on. I want my modem line to be able to log on after logging off without



unplugging and enabling the CON port every time.

From: Thomas Carey

No answer here, but I'm having the same problem. Even rebooting the system didn't help mine—this is with two different modems. My line used to work just fine. The only substantive change I've made is to gen the line as a

"CRT" instead of "hardcopy" console type. What could cause this type of error?

From: Stan Gula

The error "Modem disconnect in progress" is due to AOS/VS's handling requirements for modem control signals. There is a very good document concerning modems and VS, *Load and*

*Genupdate*, in the file :util:093\_000243\_0x. Briefly, you need to set up the modem so that in its normal state, CD and DSR are down, and they both follow the line carrier. You also need to have the modem reset (and hang up the phone line) when DTR drops. The configuration string for a Hayes compatible modem is: AT&C1&D3&S1&W <carriage return>

Basically, VS likes modem control signals to work according to RS-232 standards. The trickiest thing is that DSR—in my thinking—should be HIGH any time the modem is ready (that is, powered up and ready—DATA SET READY, right?). CD should follow the line carrier, and VS drop DTR when the console's owner process terminates. VS then expects CD and DSR to drop within a few seconds.

## Binary printer control



From: Nancy Pratt

We have a Fortran 77 program that is printing directly to @LPT. The file being printed has binary printer control characters. The printer @LPT has binary mode enabled. What is the best way to have this printer recognize and interpret the binary characters correctly? We cannot use the command QPRINT /BINARY/QUEUE=LPT.

From: Kevin Danzig

I tried to do what you want from a Cobol program with no success. What we do is write the file to disk (@LPT would do the same) and close the file, then from inside the program, do a call to CLI QPRINT /BINARY/QUEUE=LPT/DELETE filename. It does the same.

From: Thomas Carey

Skip the call to CLI and set up an ?EXEC packet and queue it directly from the F77 with an ISYS system call. We use it all the time. You can set all the QPRINT switches you want, just as from CLI. Δ

*Do you have an answer, comment, or question? Call the NADGUG/RDS electronic bulletin board, available to all NADGUG members. The phone number is 415/499-7628. There are no fees for use other than the telephone charges.*



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# Inside ICobol again

**A revisit to ICobol reveals a lot of activity. New products include C-Thru from Threshold and MV Windows from Digital Dynamics. Version 1.60 is in Beta testing. Version 1.70 will bring many language enhancements and the long-awaited STRING and UNSTRING verbs.**

## SYNOPSIS

This is going to be an ICobol column, mainly because I have no product to review this month. I paid special attention to the ICobol happenings at the NADGUG conference in Seattle, and I received a couple of good ICobol questions.

There were some exciting new products on the floor this year. C-Thru, from Threshold, is basically a Unix version of Screen Demon. If you decide to use Screen Demon on your AOS/VS programs, you now don't have to worry about rewriting them if you switch to Unix. MV Windows is a new product from Digital Dynamics, the people who brought you D:Drive. With MV Windows, you can run multiple programs simultaneously on a single console line, and hot key between them. I have two console lines running into my PC for exactly that reason, and I can't be alone. I hope to be able to write a column on both of these soon.

The seminars seemed to overlap more than ever this year, and I found myself making some hard choices about which to attend. All were excellent in quality, as usual. The ICobol sessions were given by Gerry Manning, Bruce Ray of Wild Hare, and an all-star panel from Research Triangle Park for the ICobol roundtable. The RTP people spoke of the upcoming changes in ICobol. Version 1.60, which

should be in beta test by the time you read this, will feature the compiler from Unix, along with all of its Cobol 85 structures and a SWAT-like debugger.

Version 1.70 will bring the long-awaited STRING and UNSTRING verbs, along with many other language enhancements, such as START LAST. For those of you who need a START LAST verb right now, here's an easy trick: move something high up in the ASCII sequence like ALL "~" to your key. WRITE it, READ it, and DELETE it. You're now at the end of the file and can do READ PREVIOUS to your heart's content.

## ICobol system calls

I was asked at the conference if system calls can be done in ICobol. My immediate knee-jerk answer was "yes." As Gerry Manning has said numerous times, you can do *anything* in ICobol. You may have to do it byte by byte, but you can do anything.

The next and obvious question was "OK, how?" It's taken me a few days to track down the documentation, but I finally found it in the back of *Using Interactive Cobol on AOS/VS*. Folks, if you're not using these, you ought to be. I'll take a very simple call and show you why.

We all have a need for doing date arith-

metic invoices, aging reports, and so on. We also all have some kind of awful kludge of a way of handling it—multiply the year by 365, look up the number of days before the first of the month in a table, add the day of the month, and so on. Or something to that effect. How about one nice, two-line routine to do it all?

First, the CBCALL.LB library must be patched into ICX. No big deal, and it only has to be done once. With Screen Demon, you use the /CBCALL switch in MAKE\_SD\_ICX, with the normal runtime you specify CBCALL.LB when invoking the ICXLINK macro.

ICobol provides a list of system calls in the file COBSYSID.IN, located in :UTIL:ICobol. All these are values to be passed to the ?CBSYS call. The file looks like so:

```
01 COB-CREATE PIC S9(4) USAGE IS COMP VALUE IS 0.
01 COB-DELETE PIC S9(4) USAGE IS COMP VALUE IS 1.
01 COB-RENAME PIC S9(4) USAGE IS COMP VALUE IS 2.
01 COB-MEM PIC S9(4) USAGE IS COMP VALUE IS 3.
01 COB-GCHN PIC S9(4) USAGE IS COMP VALUE IS 4.
01 COB-PSTAT PIC S9(4) USAGE IS COMP VALUE IS 5.
```

and on and on for 300 or so system calls. These are the calls in your System Call Dictionary: COB-CREATE is ?CREATE, COB-DELETE is ?DELETE, and so on. We'll look at ?FDAY and ?CDAY for this example. The ICobol format of the call is

```
CALL "?CBSYS" USING CALL-MNEMONIC ID-1 ID-2 ID-3 ID-4.
```

where ID-1 is a PIC S9(4) COMP item that



holds the mnemonic, and the others are PIC S9(9) COMP items that hold AC0, AC1, AC2, and any system error.

?FDAY needs the day in AC0, month in AC1, and year in AC2, and returns the scalar date (number of days elapsed since the dawn of time, December 31, 1967) in AC0. ?CDAY accepts the scalar date in AC0, and returns the day in AC0, month in AC1, and year in AC2.

OK, now that I've lost everyone, let's see some actual code. The code is simple—this is from my invoice posting routine.

```
77 ID-1 PIC S9(9) COMP.
77 ID-2 PIC S9(9) COMP.
77 ID-3 PIC S9(9) COMP.
77 ID-4 PIC S9(9) COMP.
```

COPY "COBSYSID.IN".

The procedure is like so:

```
MOVE INVOICE-DAY TO ID-1.
MOVE INVOICE-MONTH TO ID-2.
MOVE INVOICE-YEAR TO ID-3.
```

```
CALL "?CBSYS" USING COB-FDAY ID-1 ID-2 ID-3 ID-4.
```

ADD DUE-DAYS TO ID-1.

```
CALL "?CBSYS" USING COB-CDAY ID-1 ID-2 ID-3 ID-4.
```

```
MOVE ID-1 TO DUE-DAY.
MOVE ID-2 TO DUE-MONTH.
MOVE ID-3 TO DUE-YEAR.
```

That's it. No math, no tables, no loops, just two simple calls. How many date conversion routines are you using? Do you have to worry about leap years? Not any more.

Do you do some kind of date entry checking? Silly question, of course you do. Make sure the month is between 1 and 12, and have some kind of array for the number of days in the month, which you may or may not remember to change out for leap years, and check the year, right? Want to make it simple? Data General has already done all of the work for you. Make the call to FDAY and a non-zero result coming back in ID-4 indicates an invalid date. The call is smart enough to catch all of the leap years (though it thinks 2100 is a leap year—gotta send in another STR!), so you can get rid of most of that code and do a single call.

Now, admittedly, there are some applications that I wouldn't want to try to do in ICobol. Tom Gutnick's 4,096 byte long exclusion bitmap program to turn on SYSLOG event codes is a perfect example of something that should never be done in ICobol. If someone is willing to code it in another language, you can always just do a CLI call to it from ICobol. But the date conversion routines seem to be elegant and short enough to be coded in ICobol. There's no reason why you can't start using them.

Well, maybe one reason, but it's a small catch. If you load a new rev of ICobol and forget to link in CBCALL.LB, the call will fail without any error indications. I'd like to suggest to DG that these routines be included automatically—the memory requirements have to be minimal. Failing that, we need an error message when

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?CBSYS is called, but the library is not linked. Until then, drop the following lines into LOGON:

```
MOVE 1234 TO ID-1.
CALL "?CBSYS" USING COB-CDAY, ID-1, ID-2,
ID-3, ID-4. IF ID-1 = 1234
STOP "CBCALL.LB NOT LINKED IN !",
CALL PROGRAM "#S".
```

This way, you'll never be taken by surprise.

Something else that came up was that apparently too few people realize that you can run ICobol programs anywhere. Yes, *anywhere*. Well, almost anywhere, they still won't do that Commodore 64 port for me. But other than that, anywhere. This is one of the reasons that I started using ICobol, and I'm a little surprised that the word hasn't gotten around. Data General's ICobol will run, usually without recompilation, on anything that Data General has ever made. Envyr has MS-DOS and Unix versions, and Wild Hare has Unix, MS-DOS, AOS/VS, and just about everything else from VAX to the AS-400. Except the C64. Unless you're doing things like AOS/VS system calls, your programs can be moved from platform to platform without any changes, and usually without recompiling. There are many reasons to stay with the MV line. For ICobol users, software investment isn't one of them.

### Odds and ends department

I made it back from Seattle with my annual case of NADGUG pneumonia. This was the biggest and best conference I've been to in a decade, with the VAR, DG sales kickoff, and NADGUG conference all occurring at the same time. If you missed it, you'll have a chance to rectify your mistake when we go to Denver next year.

Since ICobol 1.50, the update notice warns you that Minisam is so efficient that processes may become CPU bound. Yes, you read that right—CPU bound I-O routines. These people write *fast* software.

Anyway, the documentation then suggests that you insert a #W in between reads in order to restart the scheduler. This was poorly written, and did not mean to suggest a three-second delay in between reads. A #W0 will do fine. This way, we have a choice. When you need flat-out speed, run without the delay. If you want maximum users, run with it. The only

thing you can't have is both maximum users and maximum speed.

Unfortunately, there's a problem. The #W0 call, which should give a zero delay and have insignificant overhead, gives a one-tenth-second delay. This may not seem like much, but consider if you're reading 100 records a second, something my MV8 can do easily, a one-tenth-second delay between each will increase your run time

by a factor of 10!

This is not optimal. An STR has been submitted.

Next time, back to product reviews. Δ

*Tim Boyer is EDP Manager at Denman Tire Corporation. He may be reached at P.O. Box 951, Warren, OH 44482, 216/898-2711 or on the NADGUG bulletin board at 415/924-3652.*

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Framemaker runs under the X Window System and the Open Software Foundation's (OSF) Motif graphical user interface. Framemaker 2.1-X integrates WYSIWYG (what you see is what you get) word processing, graphics, layout, equations editing, and book-building into one package. Framemaker supports color display terminals, desktop management capabilities, and easy-to-use dialogues and menus.

The price for Framemaker 2.1-X on Aviion systems is \$2,500 per user. It is available immediately for shipment.

Data General Corporation, 3400 Computer Drive, Westboro, MA 01580; 508/898-4083.

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## The latest in MV security

San Diego, CA—Datalynx, Inc. presents revision 3.0 of Guardian, the profile and access control system for AOS/VS and AOS/VS II.

With the new release, users are required to have network manager privilege on both local and remote hosts to update a profile across a network. A new module allows any profile field to be changed in a specified list of profiles. Profile reports now include more information, and can be sorted by user-specified criteria. The total number of concurrent logins allowed on a system can now be specified and broken down by batch, interactive, and

network access. A new Guardian logging feature allows the system manager to generate system utilization reports by username, group number, and type of access, and also gives counts of failed login attempts. Finally, AOS/VS II custom logon system is supported.

Guardian rev 3.0 was scheduled for release at the end of January, 1991.

Datalynx, Inc., 6659 Convoy Court, San Diego, CA 92111; 619/560-8112.

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McIntyre's Mini-computer Sales Group, Inc.	19	24			
Minitab Statistical Software	47	-			
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Data General Corporation	40	46
Data General Corporation	40	47
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PICK Systems	44	50
SCIP	44	51
Sterling Software, Zanthe Systems Division	44	52

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Single-user list price is \$699 for Wingz 1.1 on an Aviiion server or workstation. Successive individual server licenses are \$499. Additional multi-user licenses for groups of four users are available for \$1,499.

*Data General Corporation, 3400 Computer Drive, Westboro MA 01580; 508/898-4087.*

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## Unix systems can use MV backup program

Salt Lake City, UT—DMS Systems, Inc. released its Disk Backup and Recovery (DBR) program for Aviiion and Unix machines.

Like DBR for the MV, DBR for Unix features error recovery during dumping or loading, indexes to allow specifications of files to load, selective file dumping or restoring, statistical reporting, full support of labeled and unlabeled tapes, multiple-volume backups, and multiple backups per tape.

New features include: choice of GUI or command line interface, scrollable directory trees with full mouse and keyboard support, data compression and verification, optional retry of open files, backup from multiple logical drives in one operation, user-defined macros, on-line, context-sensitive help, prevention of accidental overwrite, and display of filename, date, size, and access privileges.

Revision 1.1 of DBR for Unix was scheduled for release in January, 1991, and will support DG/UX, AIX and SCO Unix 3.2. Future versions will support additional Unix variations.

*DMS Systems, Inc., 1111 Brickyard Road, Salt Lake City, UT 84106; 800/284-8333.*

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## Cyberquery for non-tech users

Denver, CO—Cyberscience expanded

its Cyberquery report writer to provide a menu driven tool that allows non-technical computer users to access information.

This new front end to Cyberquery is called Menu Cyberquery (MCQ). With pop-up windows, it allows reports, graphs, and charts to be produced instantly. MCQ reportedly requires very little training or understanding of the data base. It enables

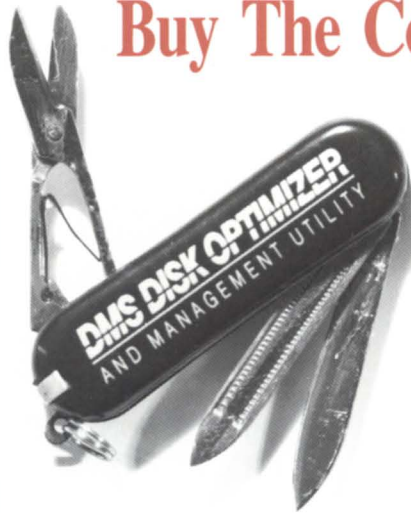
technical programmers and non-technical end-users to use a common interface to their data, promoting interaction and sharing.

MCQ runs on the DG/UX operating system on MVs and Aviiions.

*Cyberscience Corporation, 10065 E. Harvard Avenue, Suite 800, Denver, CO 80231; 800/451-1544.*

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Allsup and Associates	704-542-7779	ICS Computer Systems Inc	919-275-3305	Norwel Computer Services Ltd	61-945-3511
American Airlines Agency Data Systems	800-433-2602	Integrated System Technologies	214-437-9801	OD Systems Ltd	20-355-3101
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CMS Data Corporation	904-878-5155	Mortgage Computer Application Inc	801-621-3900	Sysinfo	565-76794
Computer Engineering Assoc	301-247-5244	National Investor Data Services	516-283-1100	NEW ZEALAND	
Computer Products & Repair	213-538-1900	Plantrol Systems Inc	716-326-4900	Peacock Computer Services	9-534-1382
Concept Automation Inc	703-450-6000	Professional Healthcare Systems	213-578-7000	PORTUGAL	
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## Memory expansion for MV/9500

Beverly Hills, CA—System Controllers and Interface Products (SCIP) offers the MV950, a new memory board addition for DG's 5 MIPS MV/9500 processor. Both 8 MB and 32 MB sizes are available, and with a possible four 32 MB boards, the MV/9500 can expand to 128 MB.

The MV950 is structured as a 64-bit word plus 8-bit ERCC. A mix of 8 MB and 32 MB daughter boards can be installed on the main processor board, without exceeding four 32 MB boards. The MV950 is multi-layered with surface mount components on both sides, allowing 32 MB on a 5.5-inch square. With 8 MB memory, the MV950 utilizes 1 MB DRAMS, and with 32 MB, the board utilizes the 4 MB DRAMS.

Pricing runs \$3,200 for the MV950-8 MB, and \$10,500 for the MV950-32 MB. Delivery varies from stock to 10 days.

SCIP, 441 So. Beverly Dr., Suite 2, Beverly

Hills, CA 90212; 213/282-8700.

Circle 51 on reader service card.

## ZIM releases new development products

Ottawa, Ontario—Sterling Software, Zante Systems Division announces three new ZIM products developed by Integratech Inc. Integratech Tools/Analyze-IT, Integratech Tools/Document-IT, and Integratech Tools/Test-IT are designed to increase a developer's productivity in the ZIM 4GL RDBMS environment.

Analyze-IT scans ZIM application code for poor coding or missing command files, and produces an error log. Document-IT generates reports that include application program flow, data dictionary cross referencing, and structure analysis. Test-IT automates the quality assurance phase of a ZIM application development cycle.

The new ZIM products will run on all systems compatible with ZIM, including

most Data General MVs up through the MV/40000-HA2.

Sterling Software, 36 Antares Drive, Suite 500, Ottawa, Ontario K2E 7W5; 613/727-1397.

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## Pick PICK for DG's Aviion

Irvine, CA—Pick Systems announces the availability of Advanced PICK, a relational data base management system, for Data General's Aviion. Advanced PICK is a multi-user RDBMS that provides the tools to develop multi-user applications. With Advanced PICK on the Aviion, up to 1,000 users can share a computer and a common company data base or business application.

PICK Systems, 1691 Browning, Irvine, CA 92714; 714/261-7425. △

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### Processors:

MV40000 32MB	.....	SAVE \$
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MV20000 Model 2 16MB	.....	SAVE \$
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MV20000 Model 2 16MB, FPU	.....	SAVE \$
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MV15000 Model 8 to Model 20 upgrade	.....	SAVE \$
MV15000 Model 10 to Model 20 upgrade	.....	SAVE \$
MV10000 4MB Meter high cabinet	.....	\$6,500
MV8000-II 8MB Meter high cabinet	.....	3,200
MV8000 Model 9300	.....	950
MV7800 4MB 16 slot chassis	.....	3,900
MV7800XP 4MB	.....	9,000
MV4000 2MB	.....	1,100
MV4000DC 2MB, 120MB, floppy	.....	2,250
MV2000 Enhanced 4MB 160 MB disk	.....	5,200
MPT100 Dual floppy	.....	350
MPT100 8520-D	.....	350
S-140 256KB Floating point	.....	1,500
Desktop 10 Floppy, 15MB disk	.....	875
Desktop 20 Floppy, 15MB disk	.....	1,295
S-120 256K 16 slot	.....	550
S-280 2MB	.....	1,900

### Processor Options:

8997 Expansion chassis MV15, 20	.....	\$6,300
8819 Second IOC for MV10000	.....	1,800
8762 Expansion chassis MV10,8,4,S280	.....	3,500
8761 Floating point unit MV4000	.....	950
8749 Battery backup for MV10000	.....	1,100
8746-B Battery backup for 8762	.....	
EXP Chassis	.....	900
8704 Floating point unit MV8000	.....	500

4543-B MCP1 8 Async 2 Sync DCH Ptr	.....	1,900
4463-ZT USAM-4	.....	275
4380 ISC-2 (Synch)	.....	600
4372-A TCB-16	.....	350
4371-C TCB-8 for expansion	.....	455
4368 IAC-16 RS232, 20MA	.....	2,300
4367 IAC-8 RS232, 20MA Modem Cnt	.....	1,500
4608 10 Port term. serv	.....	2,800

### Disk Storage Units:

6161 147MB Disk subsystem	.....	\$995
6236 354MB Disk subsystem	.....	1,900
6239 592MB Disk subsystem	.....	5,500
6329 120MB MV2000/MV1400	.....	1,150
6363 160MB MV2000/MV1400	.....	1,400
6491 322MB for MV2500 or CSS	.....	3,000
6554 662MB for MV2500 or CSS	.....	4,200
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6169-X D211 Monitor with keyboard	.....	165
6391-X D214 Monitor with keyboard	.....	200
6392-X D215 Monitor with keyboard	.....	225
6393-X D411 Monitor with keyboard	.....	180
6394-X D461 Monitor with keyboard	.....	375
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6026 800/1600 BPI Brown, FCC compliant	.....	1,250
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6341-A 1600 BPI Streaming Tape	.....	3,500
6270 15MB Cartridge for Desktop	.....	650
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6586-A Galaxy Tape	.....	5,200
6590 2GB Tape Backup add-on for CSS	.....	4,700
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MV15000, All sizes	
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MV4000, 4Mb	
MV4000, 8Mb	

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# Report reveals 1990 was a bumpy year

by Robin Perry  
Focus staff

It's official. Data General's Annual Report reveals that 1990 was a rough year for the company, with only a few bright spots.

Most significantly, revenues from Data General's venture into open systems were not enough to offset a 25 percent reduc-

Figure 1: Five year summary of selected financial data

Year ended <i>in thousands except per share amounts</i>	Sept. 29, 1990	Sept. 30, 1989	Sept. 24, 1988	Sept. 26, 1987	Sept. 27, 1986
Total Revenues	\$1,216,401	\$1,314,395	\$1,364,734	\$1,274,348	\$1,267,959
Total cost of Revenues	692,015	722,084	694,869	685,778	702,273
Research and Development	140,743	149,023	156,421	157,499	143,076
Selling, general, and administrative	444,583	490,653	470,616	437,675	390,920
Restructuring charge	71,700	80,000	48,700	53,800	11,000
Total costs and expenses	1,349,041	1,441,760	1,370,606	1,334,752	1,247,269
Income (loss) from operations	(132,640)	(127,365)	(5,872)	(60,404)	20,690
Interest expense, net	3,905	1,422	6,754	9,545	6,572
Gain on sale of facilities	-	14,857	5,889	-	-
Income (loss) before income taxes, net loss from unconsolidated affiliate and extraordinary items	(136,545)	(113,930)	(6,737)	(69,949)	14,118
Income tax provision (benefit)	3,230	5,800	8,800	(10,400)	4,945
Income (loss) before net loss from unconsolidated affiliate and extraordinary items	(139,775)	(119,730)	(15,537)	(59,549)	9,173
Net loss from unconsolidated affiliate	-	-	-	19,958	3,433
Income (loss) before extraordinary items	(139,775)	(119,730)	(15,537)	(79,507)	5,740
Extraordinary losses, net of tax benefit in 1986	-	-	-	44,158	34,720
Net loss	\$(139,775)	\$(119,730)	\$(15,537)	\$(123,665)	\$(28,980)
Income (loss) per share:					
Income (loss) before extraordinary items	\$(4.65)	\$(4.10)	\$(.55)	\$(2.95)	\$.21
Extraordinary losses, net of tax benefit in 1986	-	-	-	1.64	1.28
Net loss per share	\$(4.65)	\$(4.10)	\$(.55)	\$(4.59)	\$(1.07)
Weighted average shares outstanding, including common stock equivalents where applicable	30,047	29,213	28,015	26,964	27,057



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tion in proprietary MV sales, the report states. Despite losses, Data General is continuing its strategy of providing both open and proprietary systems, along with networking and interoperability functions to make them work together.

According to the report, based on the fiscal year ending September 29, 1990, Data General had a net loss of \$140 million, compared with net losses of \$120

million and \$16 million in 1989 and 1988 respectively. Restructuring charges stemming from layoffs and manufacturing plant closings in those years were \$72 million in fiscal 1990, \$80 million in fiscal 1989, and \$49 million in fiscal 1988. See the chart on page 45 for a look at Data General's performance in key areas over the past five years.

In fiscal 1990, Data General's total rev-

enues declined 7 percent from the previous year, to \$1.22 billion. Product revenues of \$785 million for fiscal 1990 represent a 10 percent decline from the previous year. MV sales were approximately \$600 million, down 25 percent from the previous year. Aviion sales were approximately \$100 million in fiscal 1990.

In the area of research and development, Data General appears committed to maintaining past levels. In fiscal 1990, research and development expenses were \$141 million, or 11.6 percent of total revenues, the report says. In 1989 and 1988, respectively, research and development amounted to 11.3 percent and 11.5 percent of total revenues. Approximately 1,250 employees, or 12 percent of DG's total workforce, are involved in research and development areas.

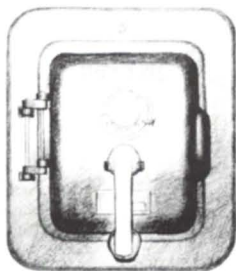
While it was a rough year for the company, there were some highlights. The report includes the following:

- The formation of a separate Eclipse business unit
- The introduction of a fifth generation of 32-bit MV systems
- 400 software developers ported over 1,000 applications to the Aviion
- Thousands more industry applications now available on the Aviion as a result of Mumps, Pick, Interactive Cobol, Business Basic, and MS-DOS emulation
- The introduction of the AV100, the lowest priced RISC system in the industry.

More Data General facts from annual report are

- Since its founding in 1968, Data General has installed approximately 300,000 computer systems worldwide
- Domestic sales represent 47 percent of total product revenue
- Domestic Aviion sales represent 52 percent of total Aviion revenues
- Total service revenues decreased 2 percent to \$432 million
- Two founders of Data General, Edson D. de Castro and Herb Richman, will not stand for reelection to the board of directors (see article on page 4).
- A new management team was formed
- Key international banks have extended Data General a commitment in principle for a new line of credit. Δ

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(performance and capacity planning)
- SIG/UX (Unix)
- SMBASIC

Let the North American Data General Users Group (NADGUG) connect you with other Data General users who have a similar special interest and who want to share information, ideas, problems, and solutions. No matter what the special interest is behind the group — equipment, systems or application software, major language, operating system, industry type — the reason is the same: to work together to exchange ideas on how to get the best performance out of your DG system.

Listed above are NADGUG's current special interest groups. If you are interested in making the connection with one of these groups, or if you have an interest that needs a group, please contact NADGUG's RIG/SIG coordinator, Greg D. Goss, at 1-800-USR-GRUP (512/345-5316 outside U.S.) for further information.

## SOFTWARE

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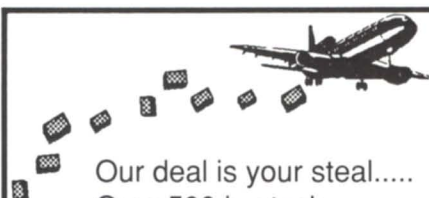
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# Data Specific

## DG sells technology, aids new venture

Data General sold part of its object oriented software technology to breakaway company, **Hyperdesk Corporation**. Headed by two DG veterans, Hyperdesk plans to develop and market a next-generation distributed computing product available on a number of platforms. Terms and conditions of the contract remained confidential at time of this publication.

Hyperdesk technology is based on the concept of distributed object management—a type of software development where elements of computer programs become free-standing components, or objects, that can be combined and rearranged in simple or complex structures. The technology resulted from over three years of software development at Data General by Hyperdesk's founders.

The president of Hyperdesk is **Herbert M. Osher**, former DG director of distrib-

uted computer office systems. With a startup staff of 15 employees, he expects to ship the first product in the second half of 1991.

**Joseph A. Forgione**, vice president, sales and marketing for Hyperdesk states that "Data General will get the product on Aviiion very early, and there is a greater chance that the product will be accepted in the market place if it's independent of a single hardware vendor." Forgione is the former director of DAA (distributed applications architecture) for Data General.

Funding for the venture will come from Tokyo-based ASCII Corporation—Japan's largest systems and application software vendor for the PC, workstation, and server markets.

## Growing out West

**NPA West**, specialists in sales, service, leasing, and recovery facilities for Data General users, expanded its engineering staff with the addition of **Chris Franks** and **Rick Gomba**. Franks, senior engineer, is formerly with **Grumman Systems** in Concord, California, and DG in Juneau, Alaska. He'll provide technical support to NPA field engineers. Gomba, a former customer engineer with **Computer Products and Repair**, is NPA's new senior field engineer.

## Everything under the Sun

In its first effort to provide service to non-Data General workstations, servers, and PCs, Data General announced that it now provides service to **Sun Microsystems** equipment and peripherals. The service is based upon an agreement with DG and Apex Computer, a fourth-party service provider based in Redmond, Washington. Apex will train DG field engineers, provide spare parts and inventory, and offer additional backup services to DG technical staff. Same-day four-hour response time or next-day response options are offered.

Dan Williams, DG spokesperson, said that when DG entered the open systems environment, it discovered a market demand for an organization with DG's infrastructure to service Sun systems. DG has

provided service for third-party peripherals for the past three years, and is exploring similar programs for the PC market.

DG Sun Microsystem service will initially be provided in 14 metropolitan areas: Atlanta, Boston, Chicago, Dallas, and Detroit. Also: Houston, Los Angeles, New York City, Orlando, Philadelphia, St. Louis, San Francisco, Seattle, and Washington, D.C. For more information, call 1-800/DATAGEN.

## Service for Perfect Terminals

Customers left orphaned by the demise of **The Perfect Terminal** video display manufacturer can now get service from **Bayside Computer Corporation**. Bayside purchased assets of The Perfect Terminal, and assumed support and service of its terminal emulator for MV systems. Bayside Computer is a nine-year-old company located in Fremont, California; 415/490-8733. △

# Alliances

## Diskopt at SEPAC

Under an agreement with DMS Systems, Inc., Data General's SEPAC (Systems Evaluation and Performance Analysis Center) now sells Diskopt, DMS's disk optimizer and management utility for AOS/VS and AOS/VS II operating systems. DMS continues to provide support services for DG SEPAC Diskopt customers. SEPAC consultants will offer trial copies of Diskopt for customer evaluation. The Diskopt utility provides disk defragmentation and directory restructuring.

### RIG/SIG gigs

FEBRUARY

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#### February 8, 1991

Deadline to submit session proposals for NADGUG 91.

Contact: Debra Bedrosian, 508/898-4067

#### February 12, 1991

L.A. EDGE (Los Angeles end-users of DG equipment)

7 p.m.

Brookside Country Club

Contact: Mark Speer, 818/897-7777

RIG/SIG gigs are notices of regional interest groups (RIGs), special interest groups (SIGs), and NADGUG events. If you would like your group's meetings posted here, please send a notice to *Focus* magazine, Livingston Building, Suite 250, 3420 Executive Center Dr., Austin, TX 78731; fax 512/343-7633. We must receive your notice by the 5th of the month, two months prior to the actual event.



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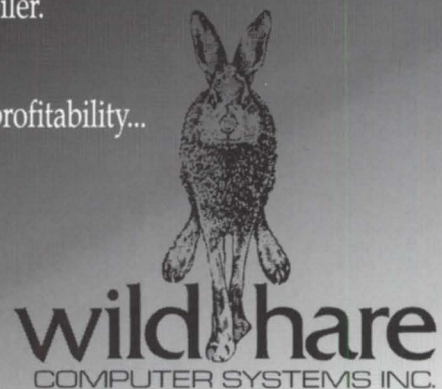
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MIGRATING TO AViiON

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